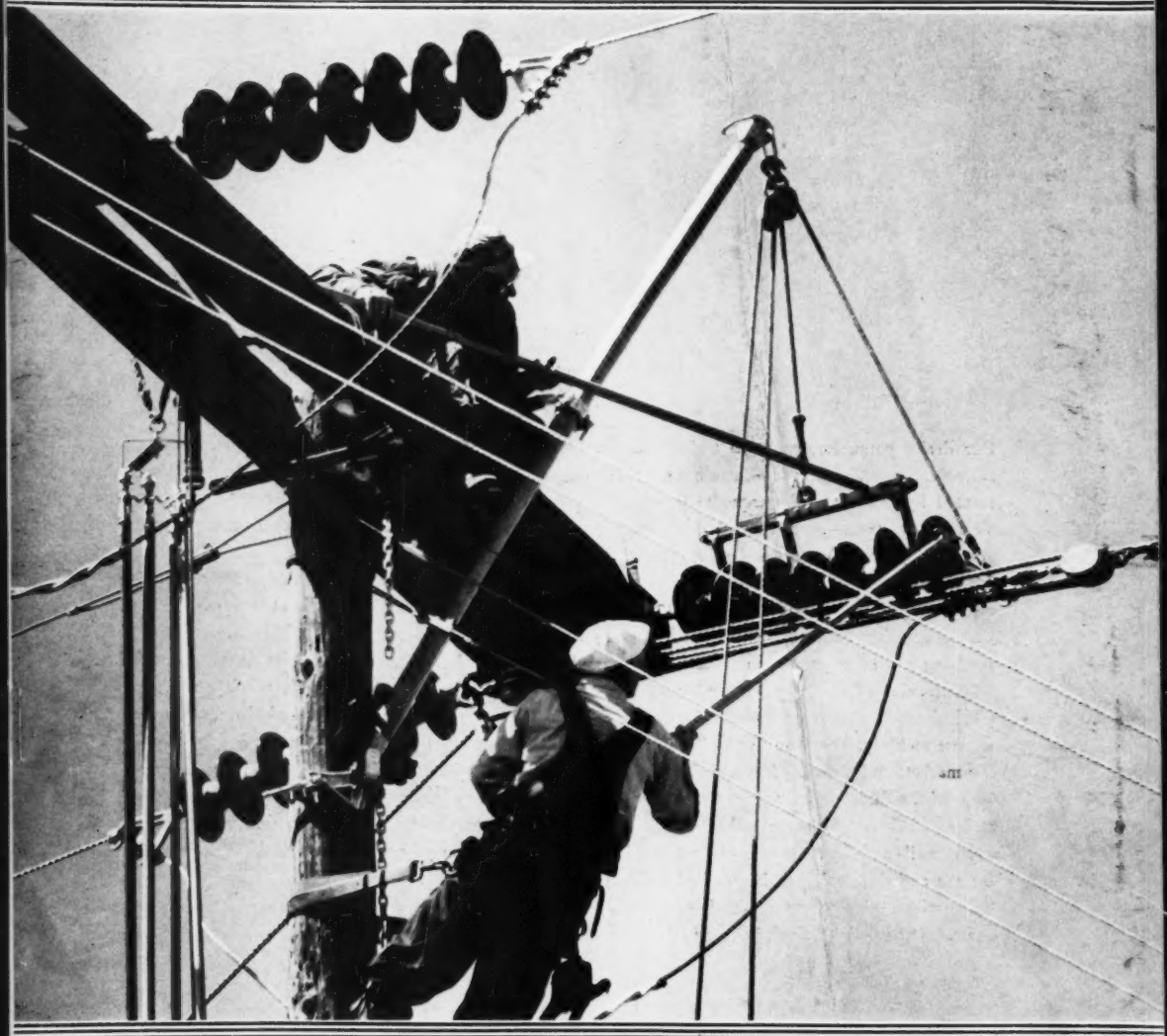
ELECTRICAL WEST

February 1951
25 Cents



32nd Annual Review and Forecast

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

Our dealer counselors assist in training dealer sales personnel. Their instruction is supplemented by the work of our home economists, who demonstrate—and teach salespeople to demonstrate—the features and selling points of appliances offered for sale. Dealer counselors also give qualified assistance in analyzing markets, suggesting better store layouts, better advertising and sales promotion plans.

Summaries of sales by market areas—compiled from dealer reports—are furnished to dealers monthly. They are invaluable in analyzing markets and planning future activities. Some 70% of the dealers send reports to us regularly, and all of them are encouraged to do so.

By mail and by personal contact we keep dealers and their salespeople supplied with material which gives them an understanding of our rates and policies. Such items as sales manuals on certain appliances, for example, assist directly in making sales.

We furnish dealers with sales contact plans, specific and complete even to card and paper forms for carrying them out.

Our advertising, promotion and other selling forces back the dealer's own at every point. When campaigns are planned, dealers are given advance information on schedules so they can arrange for tie-in ads. Banners, window cards and other materials are furnished them.

Any prospective purchasers unearthed by our adequate wiring advisors, other employees or through inquiries made at any of our offices are referred to dealers. And group demonstrations by our home economists help make customers out of prospects.

Edison

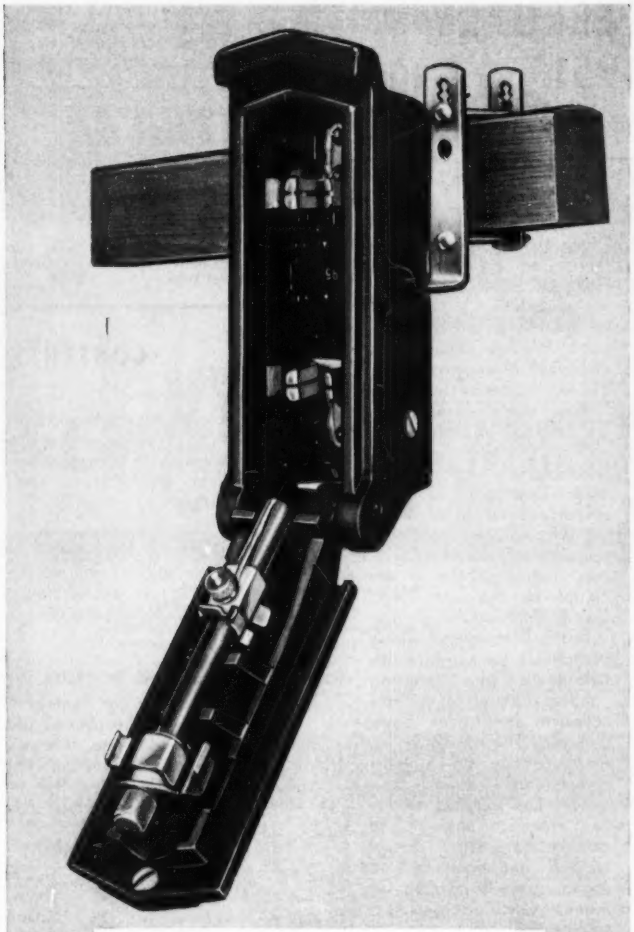
SOUTHERN CALIFORNIA EDISON COMPANY

For fusing and disconnecting, this is the most cutout for your dollar

This G-E nonindicating fuse cutout is the most reliable of all porcelain enclosed types. It costs less to maintain. With practically no moving parts, it is the sturdiest cutout built. And you stock fewer replacement parts since all contacts, fuse holders, and other items are interchangeable with G-E cutouts manufactured during the last 24 years.

So—unless you have banked secondaries or other conditions that make indication necessary—this is the cutout to use. It's the lowest-cost all-round cutout providing for fuse holder or disconnecting blade.

Stocked in 50- and 100-ampere sizes, in both 5.2 kv and 7.8 kv ratings. For details Contact your G-E Apparatus Office. *Apparatus Department, General Electric Co., Schenectady 5, New York.*



compare it . . .

MECHANICALLY—Housing is of wet-process porcelain glazed inside and out. Door is of Textolite*. Double interlocking barriers between contacts. Hanger cemented to housing permits vertical, tilted and swivel positioning.

ELECTRICALLY—Generous size of contacts, which are self-aligning, provides liberal contact area. All contacts are silver-plated.

FUNCTIONALLY—Provides positive full-range current interruption. Fuse holder is isolated from contacts in housing when door is open. Fuse holder (or disconnecting blade) cannot be placed in cutout door incorrectly. Permits easy and quick replacement of blown fuse.

*Reg. Trade-mark General Electric Company

GENERAL ELECTRIC

406-38

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

FEBRUARY 1951

SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S.
The all-industry magazine of progress, established 1887, and incorporating the "Electrical Journal," "Journal of Electricity, Power and Gas" and "Journal of Electricity." Contents copyright. Sixty-third year of publication

VOL. 106 NO. 2

ELECTRICAL WEST

George C. Tenney, Editor
W. A. Cyr, Associate Editor — Walter C. Heston, Engineering Editor
Peggy Boyer, Assistant Editor — John Cootz, Typography

Next Month

A feature for March will be an article describing the Davis Dam project on the Colorado River, now nearing completion. There will be another article by Lloyd Hunt, this one dealing with simplified arrangements for 230-kv. substation buses.

New electrical engineering facilities at the University of Washington will be described in a second article depicting progress of Western universities. In engineering also, will be a pictorial presentation of a new 6,000-kva. mobile substation acquired by the San Diego Gas & Electric Co.

In the lighting and wiring section will be a special article dealing with interesting lighting features of the new coliseum at Oregon State College. There will be a timely article on a most complete runway lighting system just installed at the San Francisco airport. The contractor used unusual methods and equipment to speed up the installation. Of interest also to electrical contractors will be a study of operating cost ratios by the Spokane Chapter of NECA. This should prove of value to any contractor in comparing it with his own figures.

Luminous ceilings are becoming the vogue in commercial lighting. Data will be given on a recent installation at Saks Fifth Ave. in Beverly Hills.

All of this in addition to the regular Electrical West features.

CONTENTS

Mobilization for Defense 73

Highlights of electric utility operations in the Far Western states: comparisons of Western with the national operations. Outlook for 1951 in view of today's conditions.

Power Construction Tempo Stepped Up for 1951 76

Western utilities will spend $410 million in 1951 on accelerated preparedness programs. New generation will be 1,673,300 kw.

Business as Unusual Will Be 1950's Pattern 106

Leading with an analysis by Kenneth Hampton of the over-all situation for appliances and wiring, followed by the most thoughtful opinions from utility sales executives in respect to the territories, and markets, served by their companies.

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Cover Photo: Hotstick crews reinsulate Washington Water Power Co.'s Pend Oreille line to 110 kv.

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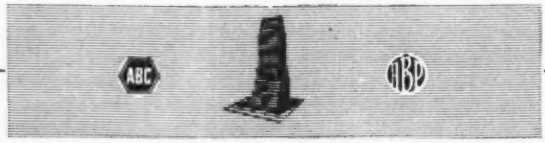
San Francisco (4) ..... Tom Carmody, 68 Post St., DO. 2-4600



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FOR DEPENDABLE MANUAL OR REMOTE CONTROL OF

capacitors . . .
street lighting . . .
airport lighting . . .
flood and other outdoor lighting . . .
sectionalizing . . .

L-M KYLE OIL SWITCHES

KYLE Type GR Motor-driven Remote-Control Oil Switch
100 amperes, 15,000 volts

The manually operated type G looks the same except for the separately housed motor-control mechanism on the left side. Total height including bushings, 18½"; tank, 7¼" diameter. Hangers for direct pole or crossarm mounting.

● L-M's KYLE oil switches are available in manual control type G, in electric remote control type GR, and in the new three-pole manually operated types 1G, 2G, and 3G shown at right.

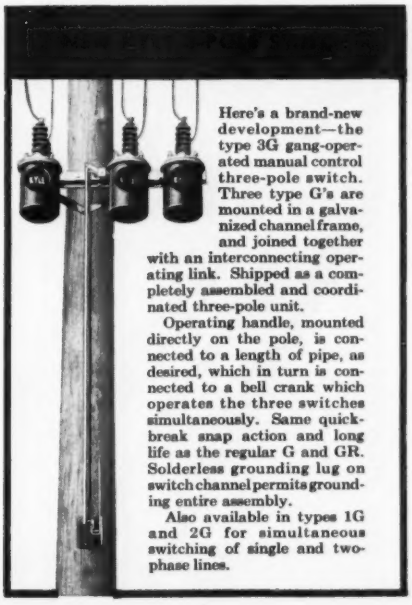
They are sturdy, dependable, economical; they provide many features that make them most desirable for a variety of light-duty load-break operations within their 15 kv 100 ampere rating.

KYLE switches provide fast operation. Contacts are fully open in less than a cycle. Double copper-tungsten contact tips minimize burning and pitting, assuring long life. The switches are light in weight, easy to install. Cost is moderate (G costs less than $37!); and they give long, dependable service. They are safe to use. The mechanism is insulated from the tank; head and operating handle are electrically dead. The only live parts are the top bushing terminals.

Type GR with Electric Control—The remote-control type GR has a shaded-pole 115-volt 60-cycle AC motor with control and selector switch to open or close the switch. It may also be operated manually if desired. There are no magnets requiring continuous current—the switch uses power only during actual opening and closing. Three single-phase type GR switches may be connected for simultaneous remote switching of three-phase circuits.

There's nothing to stop you from getting full information . . .

Ask the L-M Field Engineer for details and a copy of this inclusive Bulletin CR2 on oil switches; or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).



Here's a brand-new development—the type 3G gang-operated manual control three-pole switch. Three type G's are mounted in a galvanized channel frame, and joined together with an interconnecting operating link. Shipped as a completely assembled and coordinated three-pole unit.

Operating handle, mounted directly on the pole, is connected to a length of pipe, as desired, which in turn is connected to a bell crank which operates the three switches simultaneously. Same quick-break snap action and long life as the regular G and GR. Solderless grounding lug on switch channel permits grounding entire assembly.

Also available in types 1G and 2G for simultaneous switching of single and two-phase lines.

5R

LM®

LINE MATERIAL Kyle Oil Switches

clean as a

ROME • EMT is available in ½", ¾", 1", 1¼", 1½" and 2" from Rome Cable warehouse stocks as follows:

Torrance, Calif.	Dallas, Texas
Los Angeles, Calif.	Salt Lake City, Utah
Denver, Colo.	Seattle, Wash.
San Francisco, Calif.	Chicago, Ill.

• ROME•EMT 90 Degree Elbows Now Available

Rome Cable now supplements its thin wall conduit line with ROME • EMT 90 degree elbows in ¾", 1", 1¼", 1½" and 2".

As in the case of conduit, ROME • EMT elbows are electro-galvanized for a uniform weather-resistant exterior, while the inside has a smooth lustrous coating for easy pulling. Rome Cable's high standard of quality assures you of permanent protection against abrasion, moisture and corrosion. Make your next job a complete ROME • EMT installation.

shotgun barrel...

Rome • EMT

THE *SUPERIOR* ELECTRICAL METALLIC TUBING

Look through a length of ROME • EMT and see for yourself why it is the preferred thin wall conduit. Why, with its clean, mirror-smooth enamel interior finish, it is easier to fish . . . speeds up pulling wires. There are *absolutely no burrs* to slow up work or damage expensive cable. You will find it "clean as a shot gun barrel."

The electro-galvanized exterior has an *even*, unbroken zinc coating for maximum resistance to corrosion. Completely modern manufacturing facilities and skilled workmanship combine to give ROME • EMT uniformly high quality . . . accuracy of diameter and wall thickness. Yes, ROME • EMT is a quality product inside and out. Underwriters approved, it complies with all thin wall raceway standards.

Lighter, more economical, and easier to work than heavier types of raceway materials, ROME • EMT is definitely your best buy. Conveniently stocked in the West. See your electrical wholesaler, or call your nearest Rome Cable office today.

For unexcelled cable performance:

RoZone ®
RoMarine
RoPrene ®
RoLene
RoFlex
RoBarn
Rome Synthinol ®

Remember these names for dependable quality.

It Costs Less to Buy the Best

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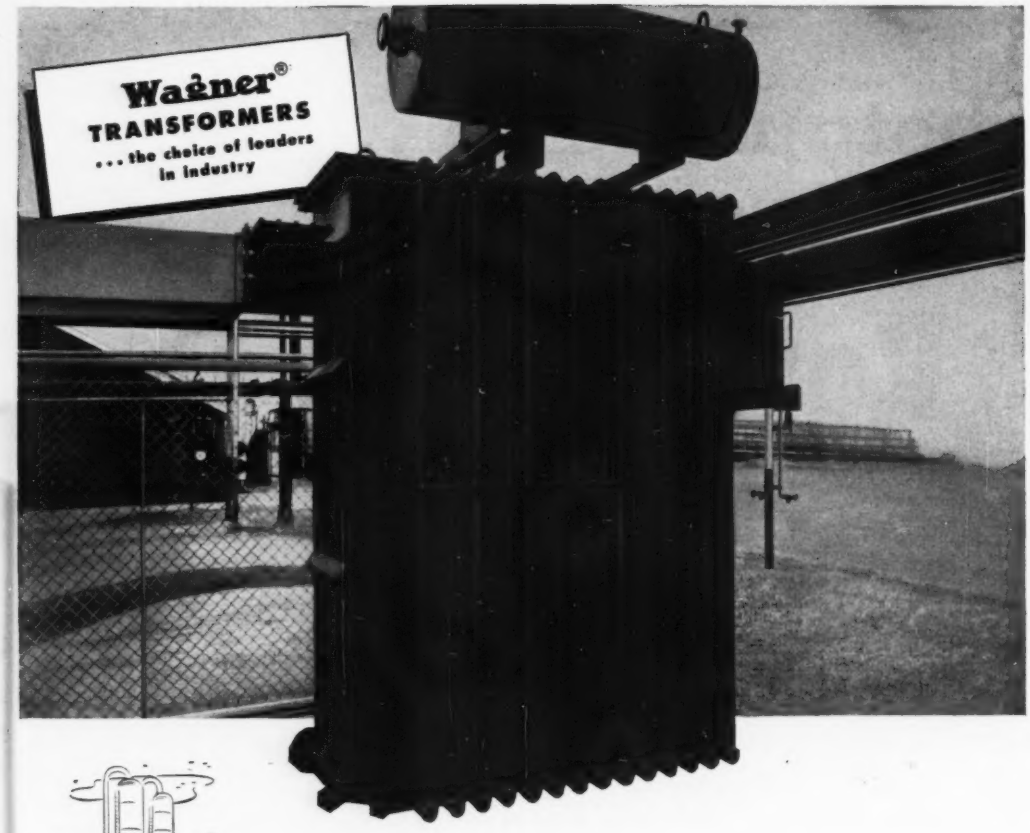
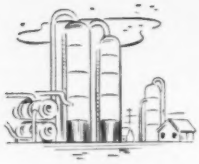




here's dependability at work!

This 2500 kva, 3 phase, 60 cycle Wagner Unit Substation Transformer is located in the high pressure division substation of the modern Ponca City Refinery of Continental Oil Company. It is throat-connected by means of weatherproof bus duct to switchgear located in an adjoining building and feeds all of the electrical load associated with the thermal cracking units and delayed coking units of this refinery. A power interruption of only a few minutes would completely disrupt this important processing and cause a shutdown of the entire refinery.

Wagner transformers are often found, furnishing *dependable* power, in spots where failure would incur great cost because they have a reputation for unfailing dependability—backed by sixty years of transformer building experience.

Bulletin TU-181 tells the complete story of Wagner Power and Substation Transformers. Write for your copy.

Wagner maintains 31 branch offices, located in principal cities, for quick, convenient engineering service and consultation. Call your nearest branch for competent advice on your next transformer installation.

Wagner Electric Corporation
1891 WE 1951

TU-4

WAGNER ELECTRIC CORPORATION
6381 Plymouth Ave., St. Louis 14, Mo., U.S.A.

ELECTRIC MOTORS · TRANSFORMERS · INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS – AIR AND HYDRAULIC

BRANCHES IN 31 PRINCIPAL CITIES

SIMPLEX-ANHYDREX CABLES STAY ON THE JOB IN WET LOCATIONS

Here's Proof

IN TEST FIGURES

Continuous testing to rigid standards proves without doubt that Anhydrex insulation will not absorb more than 20 mg. of water per square inch of exposed surface. Rarely does the figure climb that high. After one day's immersion in water at 70°C. (158°F.) Anhydrex has a dielectric constant that will not exceed 3.2. Its increase in capacitance between one and eight days' immersion at 70°C. will not exceed 3.5% for insulation thicknesses greater than 4/64", or 5% for thicknesses of 4/64" and less.

IN SERVICE RECORDS

Reports from the field, which indicate that no ANHYDREX Cable has ever failed due to water absorption, include this account: An eastern city known for its bad water conditions installed nearly 10,000 ft. of ANHYDREX Cable in its municipal signal and communications systems. During ten years' service the cables had no trouble whatsoever, although ducts and manholes there are nearly always full of water and metallic cables used in the same installations had proved inadequate. ANHYDREX Cable that was buried directly in the ground came through with the same trouble-free service, and portions of cables exposed above earth suffered no deterioration.

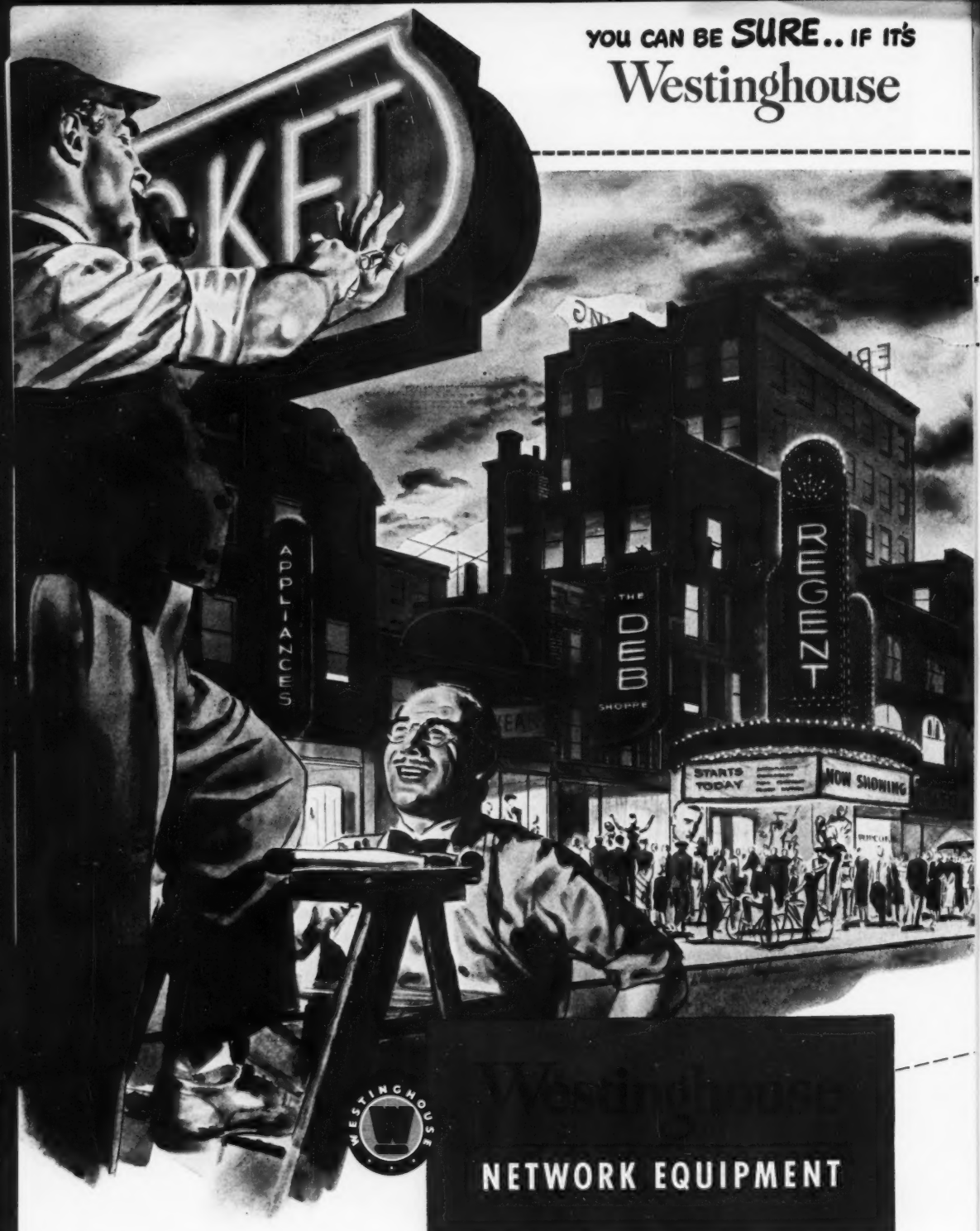
Neoprene-jacketed ANHYDREX Cables need no additional coverings. They cut down weight, diameter and cost. You can use them underground, overhead, or in ducts without fear of water and moisture, soil acids and alkalies and weathering. Specify them with confidence for transmission and distribution systems, signal and communication circuits, street, airport and park lighting.

SIMPLEX ANHYDREX

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.

YOU CAN BE **SURE**.. IF IT'S

Westinghouse



Westinghouse

NETWORK EQUIPMENT

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver.

When the shopping center orders more power

...SECONDARY NETWORKS PAY!

Twenty-one percent of all cities in the 25,000 to 100,000 population range enjoy the advantages of a secondary network system! And their number will grow, because . . .

The shopping centers are ordering more power! New lighting, new air-conditioning systems, new business machines . . . in every phase of commercial activity, the load continues to grow.

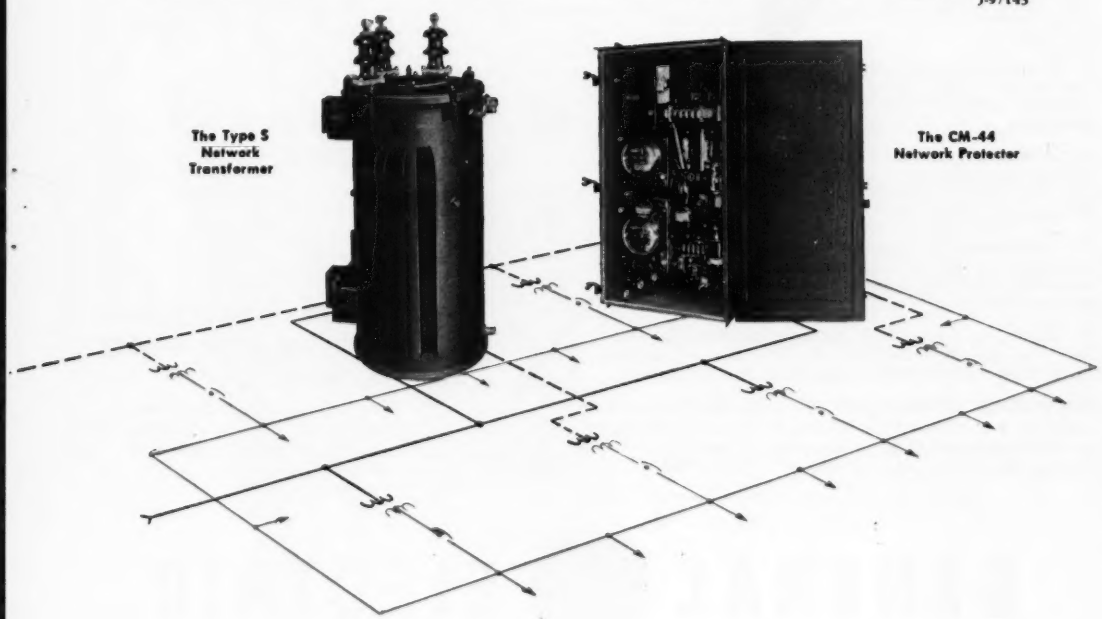
Does your system planning provide the flexibility necessary to meet this demand . . . profitably?

It does if it includes secondary networks . . . for this is the most flexible system ever devised. It permits extensions, load shifts and load growth to be accommodated *economically.* It assures a sharp reduction in operating and maintenance expense . . . simplified layouts . . . the use of less and better co-ordinated equipment. It eliminates the possibility of ultimately arriving at an over-congested condition.

The broad range of Westinghouse network equipment enables you to employ the type of network that best suits the foreseeable demands. For instance, the light-duty CM-88 protector has made possible the economical *overhead* form of this system for areas where an underground system cannot be justified. It, together with the CM-44 and CM-22 protectors and associated Westinghouse network transformers, economically meets the requirements of all secondary network systems.

Booklet B-4002, "A-C Secondary Network Systems", contains complete information. And remember . . . our complete facilities, engineers and calculating boards are available to help you with your network planning. Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa.

J-97143



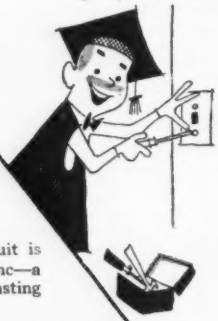
DO YOU KNOW THESE 5 TIMELY G-E WIRING FACTS?

1. HOW MUCH EXTRA CURRENT CAN YOU ADD TO EXISTING RACEWAYS?

Size for size, Deltabeston* AVA cables carry more current than ordinary cables—pack more current into raceways—because heat-beating asbestos insulation permits higher operating temperatures. When you specify G-E Deltabeston cables,
HOW MUCH CURRENT CAN YOU ADD?

2. WHAT REALLY MAKES THE DIFFERENCE IN CONDUIT?

Wiring installations get double-protection with General Electric White rigid conduit. First, the top-quality, thoroughly-tested steel pipe is galvanized. Then a tough, smooth coat of Glyptal* lacquer is applied.
BUT WHAT REALLY MAKES THE DIFFERENCE?



3. WHAT IS THE TESTED LIFE OF A G-E MERCURY SWITCH?

The silent General Electric mercury switch has no moving blades or contact springs to wear out—a pool of mercury does all the work! Mercury switches provide exceptionally long service—
CAN YOU GUESS HOW LONG?

4. WHAT'S THE NEW STANDARD GROUNDING OUTLET?

For easy installation the new standard G-E twin grounding outlet can be side wired or back wired, but
WHAT'S THE NEW STANDARD?

5. HOW DO YOU POSITION A BOX EXACTLY WHERE YOU WANT IT?

Positioning a box exactly and bringing it to the exact level is now an easy job with the new G-E bar hangers.
HOW'S IT DONE?

ANSWERS

1. ☐ G-E Deltabeston AVA cables can add as much as 64% more current-carrying capacity than ordinary Type R building wire.

2. ☐ G-E White rigid conduit is *hot-dip galvanized* in pure zinc—a premium finish that gives lasting protection.

3. ☐ In laboratory tests General Electric mercury switches stand up under more than a million On and Off cycles—about 247 years of normal use.

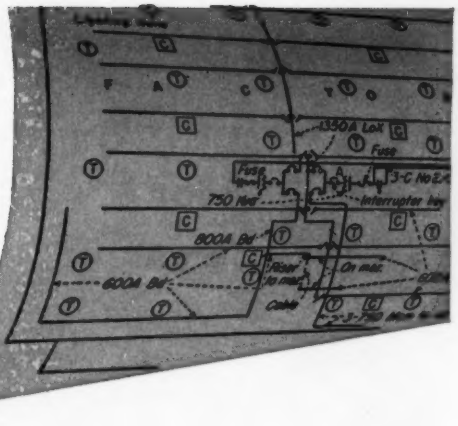
4. ☐ The new standard grounding outlet (GE3588) is designed to take three-prong grounding plugs, two-prong polarized plugs, and regular two-prong parallel-blade plugs.

5. ☐ The new line of G-E bar hangers offers you the offset you need. New design lets fixture stud move easily for leveling and positioning, locks it tight when it's set.

FOR FURTHER INFORMATION on any General Electric wiring materials, see your local G-E Construction Materials Distributor, or write to Section K53-225, Construction Materials Department, General Electric Company, Bridgeport 2, Connecticut.

* *Registered Trade Mark of General Electric Company*

GENERAL ELECTRIC



FOR EASY FISHING...

choose your conduit from Central's Big 4

You'll reduce hang-ups and kinked wires when you fish through Central Conduit. It's smooth and uniform inside, and makes-up tight to reduce hang-ups at joints.

Four types of Central Conduit let you pick the best one for each job. There are 3 types of full-weight rigid . . . "Cenlaco" with a hot-dipped galvanized finish inside and out . . . "Central White" with electro-galvanized zinc outside and black enamel inside . . . "Central Black" with black enamel inside and out . . . and "Central EMT", light-weight sturdy steel conduit that's electrogalvanized outside, black enameled inside.

All Central Conduit is approved by Underwriters' Laboratories and the National Electrical Code . . . and backed by our 111 years of tubular production experience.

Demand for Central Conduit far exceeds the supply . . . but your supply house is filling orders as quickly and as fairly as he possibly can.

SPANG-CHALFANT

Division of The National Supply Company

GENERAL SALES OFFICE: Grant Bldg., Pittsburgh, Pa.

District Offices and Sales Representatives in Principal Cities

NEW TYPE QB CIRCUIT BREAKER for NQB Lighting Panelboards

a NEW QB circuit breaker for NQB panelboards features an isolated arc chamber lined with arc resisting material which eliminates need for metal plates or other interrupting means. Operating mechanism is quick-make, quick-break. Stainless steel latch, independent of trip element, assures superior vibration characteristics. Thermal-(*Coilless*) Magnetic trip element is typical of other lighting panelboard types in Square D's broad line.

All Have 2-WAY PROTECTION

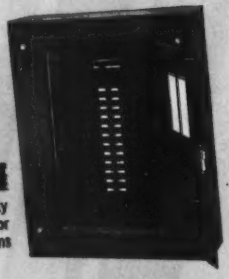
THERMAL element is a bi-metal providing positive and timed response to heating effects of both load current and surrounding atmosphere. The life of wire insulation is prolonged by limiting total temperature to a safe value.

MAGNETIC element responds instantaneously to the higher values of current characteristic of dangerous overloads and "shorts." Damage is minimized.

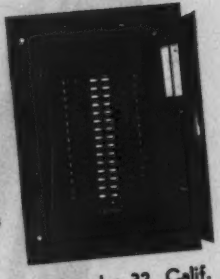
Both ARE NEEDED FOR Complete PROTECTION

Completes the Line

TYPE **NMO**
MO Plug-In Standard Duty breakers for AC systems



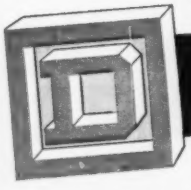
TYPE **NQB**
QB heavy duty breakers for AC systems



TYPE **NAB**
ML heavy duty breakers for AC-DC systems

Write for Bulletin 1640, *Square D Company*, 4335 Valley Blvd., Los Angeles 32, Calif.

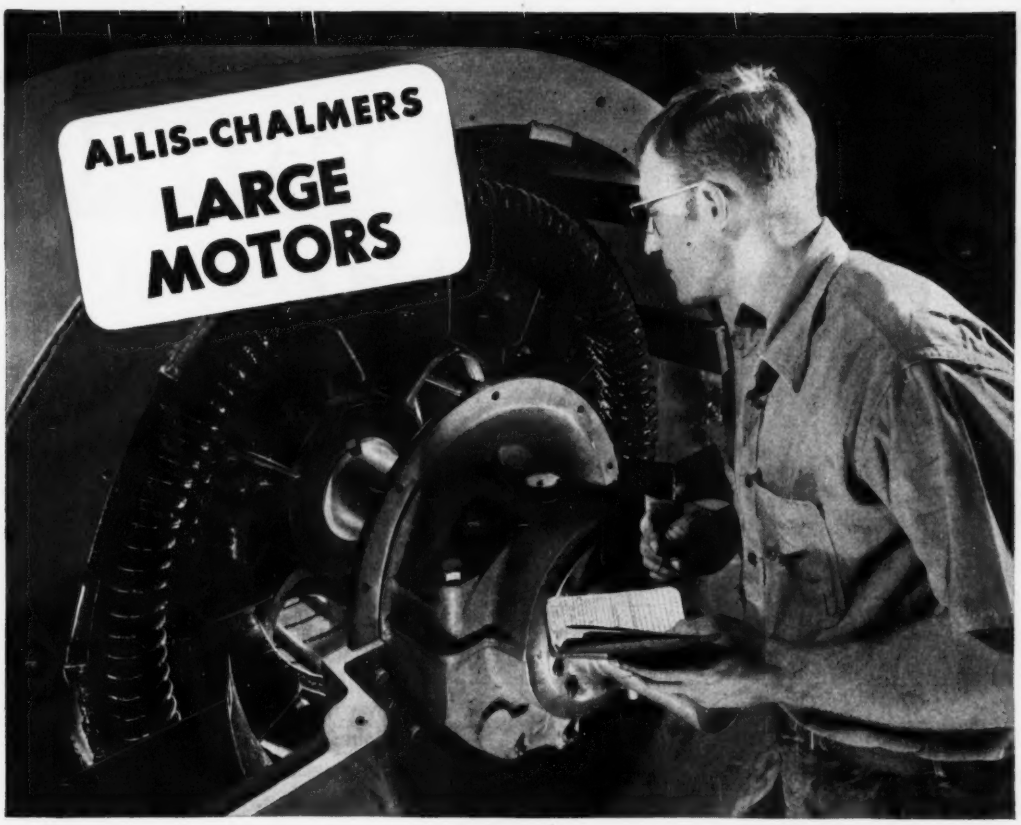
ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS



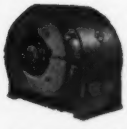
SQUARE D COMPANY

DETROIT · MILWAUKEE · LOS ANGELES

SQUARE D COMPANY CANADA LTD., TORONTO • SQUARE D de MEXICO, S.A., MEXICO CITY, D.F.



HOW'S THIS FOR Accessibility?



ONE MAN can perform all routine maintenance jobs on this brand new line of Allis-Chalmers large motors. He can remove the upper halves of the end brackets and air baffles and reach right inside the motor with his vacuum cleaner or air hose. There is plenty of room to reach up back of the stator core through air discharge openings in the stator yoke.

Bearings Protected

The capsule-type sleeve bearings need not be opened up and exposed when the end bracket halves are removed. The bearings are protected from abrasive dust and dirt while the motor is being cleaned. This eliminates the work usually required to dismantle the bearing, clean and reassemble it during routine maintenance.

Easy Installation

Large stator air discharge openings with removable louvers allow ample room to use an electric or air drill for doweling and bolting the motor to the foundation. These large discharge openings plus adequate air intake openings in the end bells provide cooling air at low velocities.

Sleek Appearance

You'll be proud of the appearance of the new Allis-Chalmers motor in your plant, too. Clean, simple lines and smooth contours give outward confirmation of its inner strength.

These new design Allis-Chalmers drip-proof and splash-proof bracket bearing squirrel-cage induction motors are built in sizes from 60 hp at 300 rpm to 1500 hp at 1800 rpm. Ask your Allis-Chalmers representative to show you the details of this exceptional new motor or write Allis-Chalmers, Milwaukee 1, Wisconsin for Bulletin 05B7542. A-3251

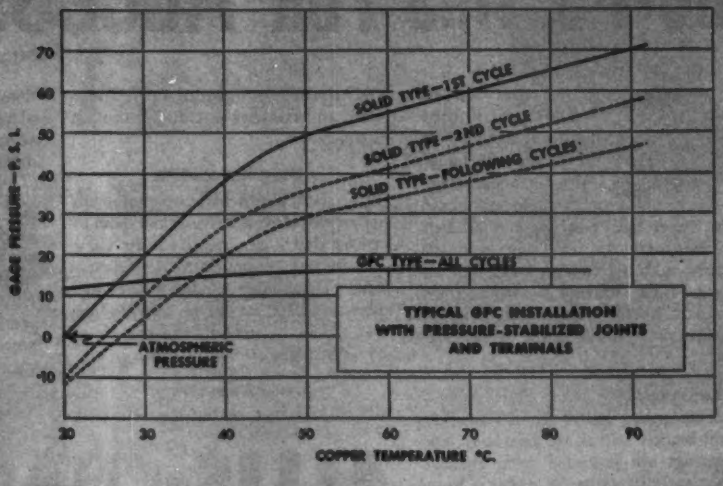
ALLIS-CHALMERS

Here's why it pays to use GPC GAS PRESSURE

1. Greatly improved service reliability at little added cost.
2. Positively avoids burst or collapsed joints.
3. Relieves the sheath of high internal pressures that aggravate fatigue failures.
4. Prevents moisture being drawn into the cables.
5. Maintains constant supervision over the integrity of the sheath and tightness of joints and permits location of sheath breaks before failure can occur.

Increased current carrying capacity is an important advantage of GPC Cable. Made possible because sheath stresses are carefully controlled.

Comparison of internal pressures during heating
Solid type cable versus GPC Gas Pressure Compensated Cable.



COMPENSATED CABLE

for both high and low-voltage

■ Engineers are generally familiar with the troubles experienced with high voltage cables due to the internal pressures and vacuums generated by the expanding oil saturant of the cable.

Our "GPC" Gas Pressure Cable offers a complete solution to that problem.

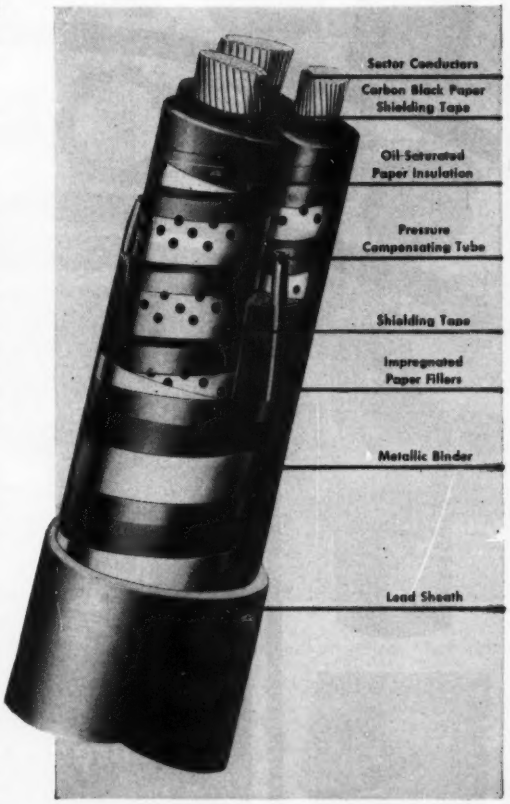
It is not generally appreciated that the cable expansion problems are not restricted to high voltage cables but are equally prevalent in all types of paper insulated cables. Failures in 600 volt paper cables are attributable to lead failures in the majority of cases.

The "GPC" Gas Pressure principle is equally applicable to low voltage multiple conductor cables. By providing perforated tubes to act as a cushion for the expanding oil, and a nonperforated tube to act as gas pressure feed for stabilizing joints, terminals and the entire cable run, the internal pressure can be controlled within the safe limits of operation of the sheath and kept above atmospheric at all times.

The result is that stretched sheath and burst or collapsed joint sleeves are avoided. Moreover, the harmful effect of longitudinal expansion at manhole bonds is minimized since one source of strain in the sheath is avoided.

In case the sheath is damaged by mechanical injury, corrosion or repeated bending, the pressure of the gas will prevent moisture from being drawn into the cable, and the lowering of gas pressure on the system will give immediate warning that a damaged sheath exists. It is not difficult to find the location of the leak either by observation, gas pressure drop or gas flow devices installed on the joints.

Type GPC Cable and the necessary accessories add a very small percentage to the cost of the cable installation. GPC Cable is recommended for all installations of multiple conductor cables, especially those subject to wide fluctuation in temperature, such as aerial cables or power feeders carrying heavy loads. Write for complete engineering information.



AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA STEEL COMPANY, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM, SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

AMERICAN PAPER INSULATED CABLES

UNITED STATES STEEL

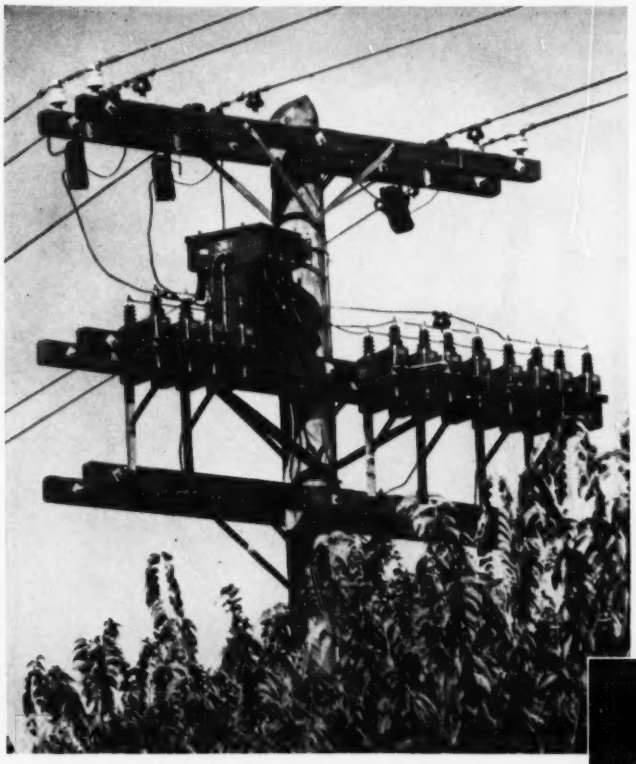
This Familiar Green Label

Is Your Assurance of Quality

STEEL CITY LEADS IN MEETING CONTRACTORS' NEEDS

STEEL CITY ELECTRIC COMPANY

1207 COLUMBUS AVENUE, PITTSBURGH (33), PENNA.

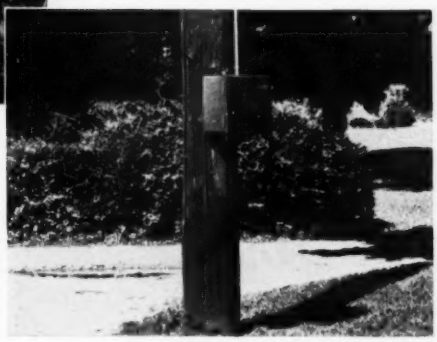


Capacitors profitable

at rate of 1 kvar for each 286 ft. of feeder

Indianapolis Power & Light Company raising power factor to near-unity by adding 180-kva pole-mounted capacitor banks, many of them with oil switches

This is a current-controlled switched capacitor bank at Eastern and Sutherland Avenues in Indianapolis. An oil switch is mounted with the capacitors.



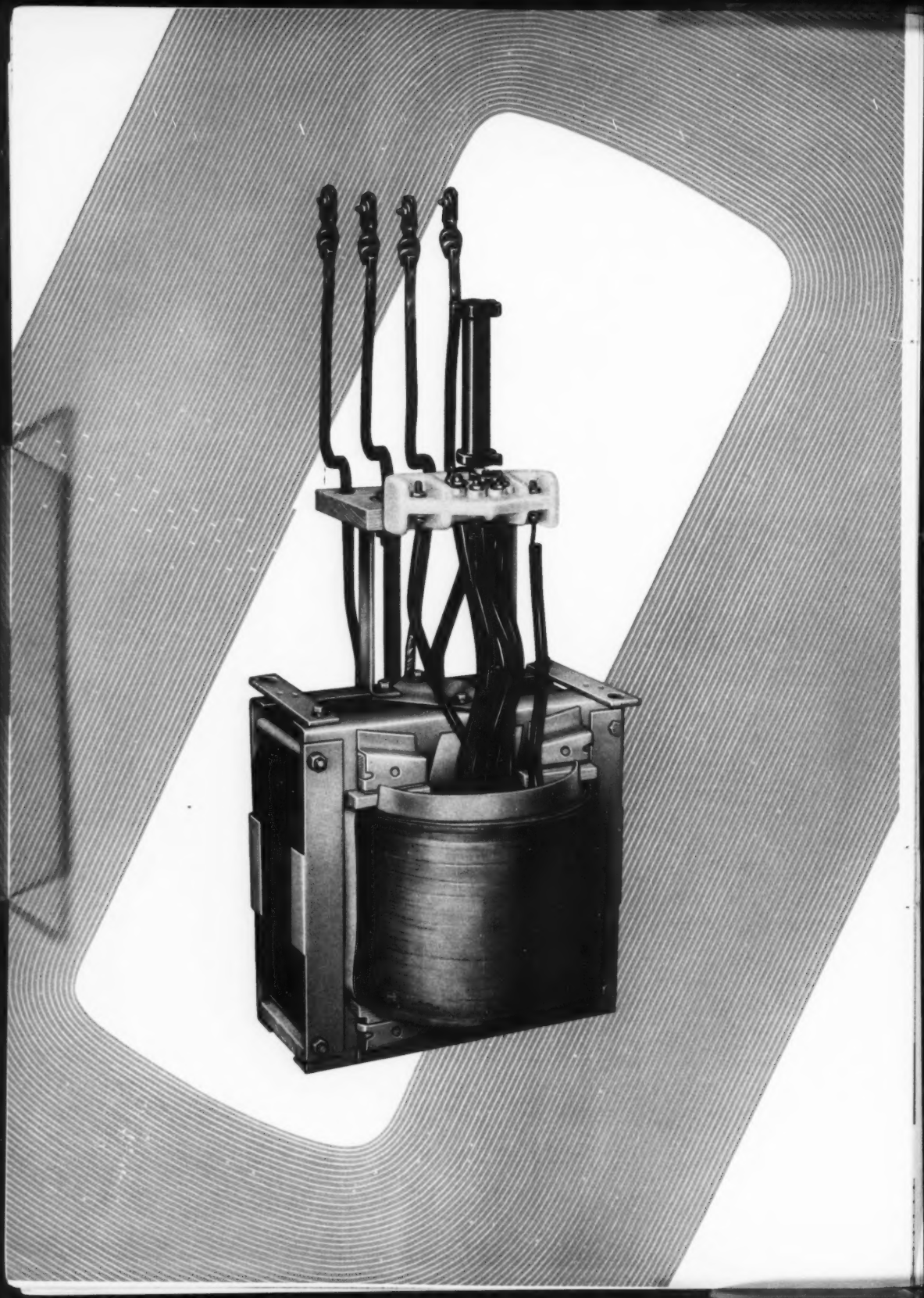
An interesting feature of the Indianapolis installations is the method of controlling the many switched banks. Tests showed that kvar loading followed kva loading on practically all feeder circuits. Consequently a current relay, shown here, operated from a current transformer in the feeder, is used to control the oil switch installed with the capacitors on the next pole.

Indianapolis Power & Light Company is currently installing pole-mounted banks of General Electric capacitors out along their 4-kv feeders. At the end of their present program, they will have approximately 44,000 kvar in service—or one kvar for each 286 feet of overhead 4-kv line. This is in addition to capacitors installed on the 4-kv buses at some of the larger substations.

Here is another case of a utility that is getting more effective use from its distribution system—and consequently reducing invested cost per delivered kw-hr—by raising power factor to near-unity. Have you checked recently to see how much extra system capacity you have that can be released by installing G-E permanently connected *or switched* capacitors?

Apparatus Department, General Electric Company, Schenectady 5, New York.

GENERAL ELECTRIC



SPIRAKORE

is saving users millions

Back in 1937, General Electric introduced a brand-new idea in transformer construction—the wound-core—which made possible smaller, lighter transformers, 10 to 20 per cent lower in price.

Since then, General Electric's Spirakore* transformers have saved operators more than 30 million dollars in initial investment alone. Purchasers of other transformers have profited also, since every domestic builder of distribution transformers has adopted some modification of the wound-core construction.

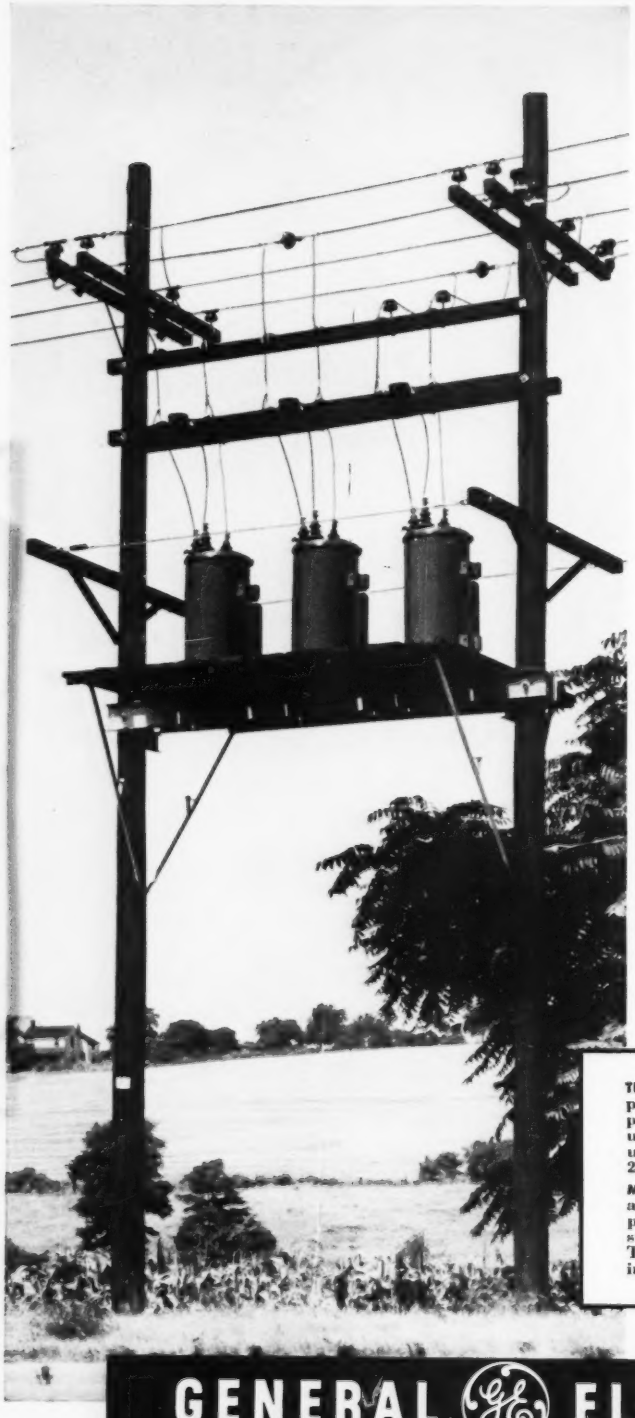
Today, General Electric builds all single-phase distribution transformers with Spirakore construction. The same combination of forward thinking, sound engineering, and skilled workmanship that produced the original Spirakore design has kept Spirakore ahead as the standard for others to try to equal. It's the finest transformer we have ever built—the finest you can buy.

We have just published this 32-page, full-color book on the Spirakore transformer. If you haven't already received your copy, get one from your local G-E representative, or write 402-102, Apparatus Dept., General Electric Company, Schenectady 5, New York.

* Registered trademark of the General Electric Co.

GENERAL ELECTRIC

402-102



Voltage regulation costs less than new copper

The simplest, least expensive way to keep voltages up for rural customers is by using voltage regulators out along the feeders, without adding new copper. Supplementary regulation maintains proper voltage regardless of load. Revenue goes up; complaints go down.

General Electric's ML-8 is a service-proved regulator built specifically for rural lines. It provides 10% automatic voltage regulation, in eight 1¼% steps. It brings you complete reliability, minimum maintenance—*at the lowest price for any regulator.*

Booklet GEA-5417 gives full information. Ask your local G-E office for a copy, or write to *Apparatus Dept., General Electric Co., Schenectady 5, New York.*

THREE ML-8 VOLTAGE REGULATORS shown in platform installation. Suitable for either pole or platform mounting, ML-8's can be used for circuits up to 7960 volts carrying up to 100 load amperes (to 150 amperes on 2400-volt circuits).

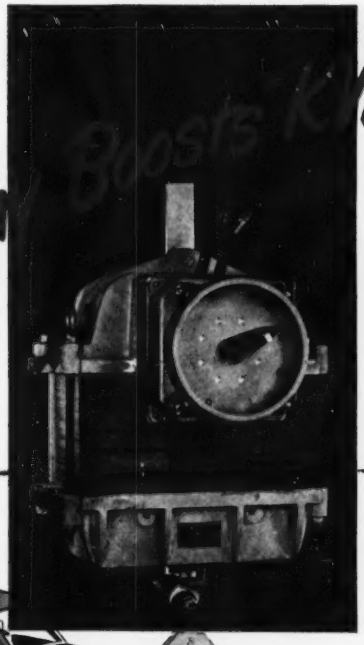
ML-8 FEATURES include a shockless, snap-action Geneva-gear drive for positive positioning of contacts, and an improved switching circuit using a bridging reactor. The switching mechanism and its operating motor are completely immersed in oil.

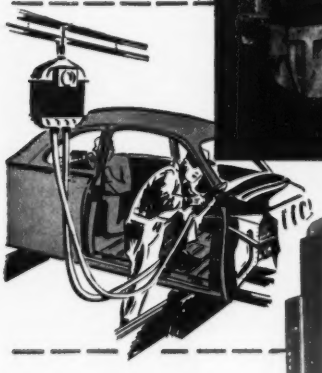
GENERAL ELECTRIC

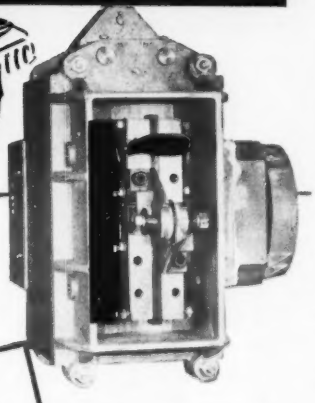
404-72

McCarthy Boosts KVA Rating 30%

with NATVAR VARNISHED FIBERGLAS







This McCarthy Type 525-PG welding transformer is compact and weighs only 458 pounds, yet it is rated 75KVA, 220 or 440 primary volts (not interchangeable), 60 cycle, 1 phase, 108°C temperature rise, at 50% duty cycle. An extra heavy heat selector switch gives secondary voltages in eight steps from 5.00 to 9.16, parallel connection, or 10.00 to 18.32, series connection.

Primary coils are insulated between turns with Natvar varnished Fiberglas tape, dipped and baked. The wound coil is then insulated with mica and Natvar varnished Fiberglas tape, again dipped and baked, and finished with air drying varnish. Secondary coils are heavy wall square copper tubes through which cooling water circulates. Leads are insulated and protected with Natvar 400 heat resistant extruded vinyl tubing.

McCARTHY ELECTRIC CO., Detroit, manufactures welding transformers used extensively on production lines in the automotive industry for welding bodies and various fabricated parts, and in the refrigerator industry for welding boxes. Since it is more practical to weld large assemblies with guns rather than on stationary machines, portability is important. Size and weight of the transformer must therefore be kept at a minimum. And because many of these units are in continuous service 24 hours a day, long life is important, too.

By designing and building these transformers for higher continuous operating temperatures, McCarthy has succeeded in raising capacity 30% without increasing the size or weight. McCarthy has standardized on Natvar varnished Fiberglas and Natvar 400 Extruded Vinyl Tubing because of their uniformly high resistance to heat, and because both have exceptional aging characteristics, which means longer life.

All Natvar flexible insulations are consistently uniform, no matter when or where purchased. They are immediately available either from your wholesalers' stocks or direct from our own.

Natvar Products

- Varnished cambric—straight cut and bias
- Varnished cable tape
- Varnished canvas
- Varnished duck
- Varnished silk
- Varnished special rayon
- Varnished Fiberglas cloth
- Silicone coated Fiberglas
- Varnished papers
- Slot insulation
- Varnished tubings and sleevings
- Varnished identification markers
- Lacquered tubings and sleevings
- Extruded vinyl tubing and tape
- Extruded vinyl identification markers

Ask for Catalog No. 21

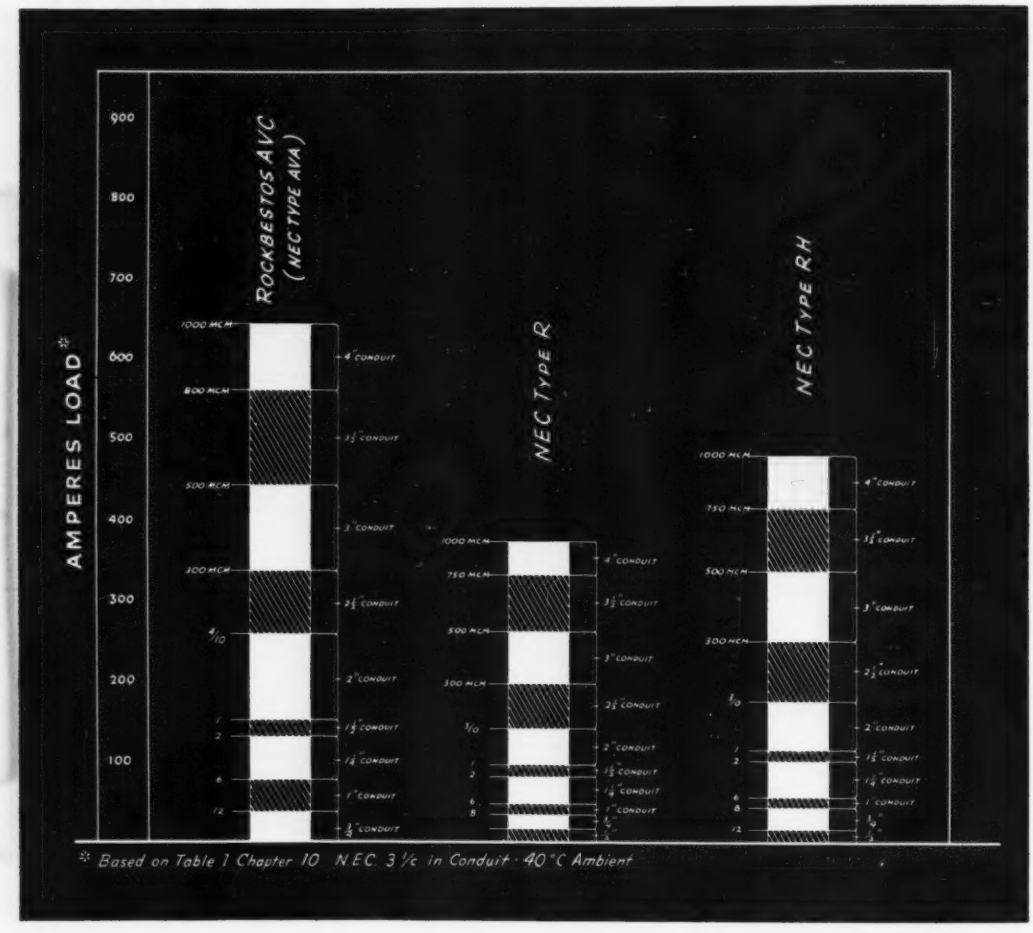
THE NATIONAL VARNISHED PRODUCTS Corporation

Telephone Rahway 7-8800

Cable Address NATVAR: Rahway, N. J.

233 RANDOLPH AVENUE ★ WOODBRIDGE, NEW JERSEY

Are Electrical Loads Outgrowing Your Conduit?



Here's the fast, inexpensive way to take care of electrical loads that have outgrown their conduits — just replace present cable with Rockbestos A.V.C. . . . *with Rockbestos A.V.C. you can increase conduit capacity without increasing conduit size.*

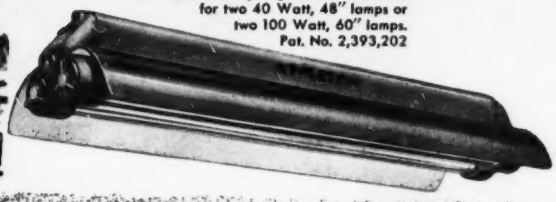
Use A.V.C. whenever load growth outruns present wiring. With it you can easily increase capacity without buying and installing larger conduit or fittings. Write today for the booklet "Rx for a Building with Hardening of the Electrical Arteries."

ROCKBESTOS PRODUCTS CORPORATION
NEW HAVEN 4, CONN.

NEW YORK CLEVELAND DETROIT CHICAGO
PITTSBURGH ST. LOUIS LOS ANGELES OAKLAND, CAL.

ROCKBESTOS A.V.C.
has a HIGHER AMPERE RATING

Type EFU—First and still finest Explosion-Proof Fluorescent Lighting Fixture. Available for two 40 Watt, 48" lamps or two 100 Watt, 60" lamps. Pat. No. 2,393,202



Industrialite High Mounting Fixture—For railroad yards, steel mills, round houses—any industrial plant calling for a ruggedly built, high-mounted lighting fixture.

BETTER LIGHT *for* BIGGER PRODUCTION

Stocklite—Provides perfect illumination for shelves and bins in stock rooms.

RLM Standard Dome Fixture—Reflector made of rust-resisting iron and finished with three coats of baked porcelain enamel. Sectionalized construction permits easy installation, convenient servicing.

Fewer rejections . . . greater safety . . . better employee relations . . . increased efficiency to meet defense demands—these are the immediate returns on an investment in good industrial lighting.

Appleton Industrial Lighting Equipment is precision-designed to provide *good light*—the right light, without uncomfortable glare, troublesome contrast or shadow. Expert engineering, unequalled manufacturing facilities and nearly a half century of experience are combined in each Appleton fixture to provide maximum efficiency at minimum installation, service and operating expense.

Appleton Lighting Fixtures are made to suit every industrial requirement—including hazardous locations—whether indoors or out. For the finest illuminating equipment or expert assistance on any lighting problem, contact Appleton—Standard for Better Lighting.

APPLETON LIGHTING EQUIPMENT

Sold Through Electrical Wholesalers

APPLETON ELECTRIC COMPANY

1709 WELLINGTON AVENUE • CHICAGO 13, ILLINOIS

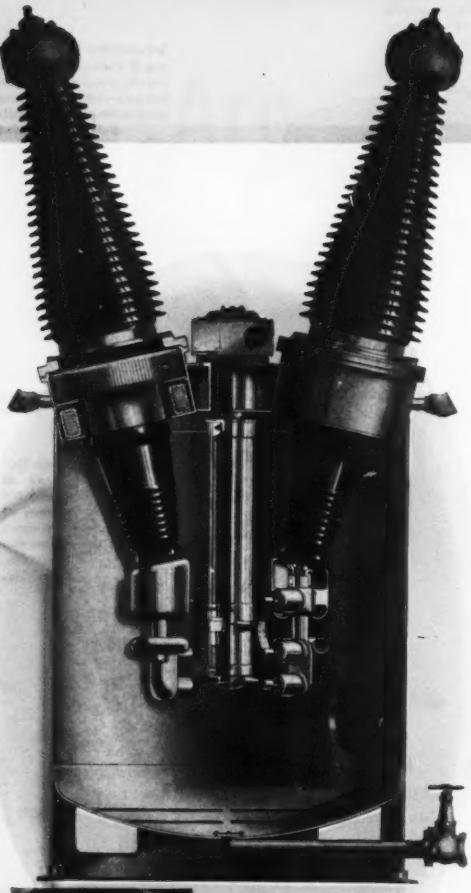
LOS ANGELES 12, 100 N. Santa Fe Ave. **SEATTLE 9, 115 Ray Street**

SAN FRANCISCO 1, 655 Minna St. **DENVER 2, 1921 Blake Street**

APPLETON

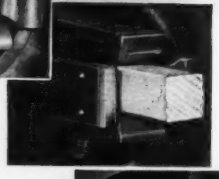
CONDUIT FITTINGS • LIGHTING EQUIPMENT • OUTLET AND SWITCH BOXES • EXPLOSION-PROOF FITTINGS • REELITES

. . . . for Improved High-Voltage Switching

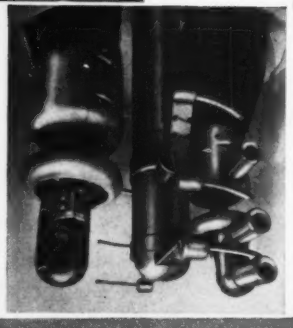


Above: Sectional Elevation 196/230-kv Rating.

At left: OPEN.



At right: CLOSED.



Above: Sliding-Shoe Nested Contacts (with Interrupters Removed).

At right: Interrupters and Blades (one side only).

PACIFIC ELECTRIC TYPE RHE OIL CIRCUIT BREAKERS for

REDUCED MAINTENANCE
IMPROVED RELIABILITY

Verify the worth of each of these listed features in the light of your own experience

Only One Moving Element in the Tank

Moving as one piece, the rotary blade-structure provides six equal-length gaps in series per pole, totaling 80 to 96 inches, according to rating.

All gaps open at equal speed throughout entire stroke, and open fully before reclosing starts.

The rotary form permits adequate blade acceleration without need of auxiliary levers or multiplying linkage in the contact housings for increasing initial speed.

Nested Sliding-Shoe Contacts

No sensitive adjustments required to fix closed position.

Arcing does not affect surface carrying load current.

Wiping action smooths and cleans surfaces.

Leaf springs apply adequate pressure regardless of wear of the shoes; eliminates need of pressure adjustment.

As moving contacts do not charge auxiliary springs nor drive contact linkage, impact on bushings and battering of stationary contact shoes is negligible.

Improved Interrupters

Oil blast interrupters confine thermal effects within the interrupting chambers. Oil is not directed into or alongside of arc path; however, relatively cool oil vapor rapidly replaces ionized portions. The usual large gas bubble does not form, with the result that ground shock and jar caused by oil displacement within the tank is eliminated.

Oil-gas separators are thereby rendered unnecessary, so are not used.

PACIFIC ELECTRIC
5815 THIRD ST., SAN FRANCISCO 24, CALIF.

PACIFIC "RHE" Oil Circuit Breakers

3-Cycle Interrupting; 10-Cycle Closing;
15- to 45-Cycle Adjustable Reclosing
115, 138, 161, 196/230, and 230 Kv
Continuous Rating, 800 and 1200 Amp
Interrupting Rating to 10,000,000 Kva at 230 Kv

Many of America's leading power systems have installed these circuit breakers, or have them on order.

Compressed-Spring Closing

The compressed operating springs stand ready for action—for years, if necessary—without anything meanwhile having to move or operate.

Operating-spring compression is by motor-operated oil-hydraulic jack which is under pressure only for the ten seconds necessary to compress the closing springs.

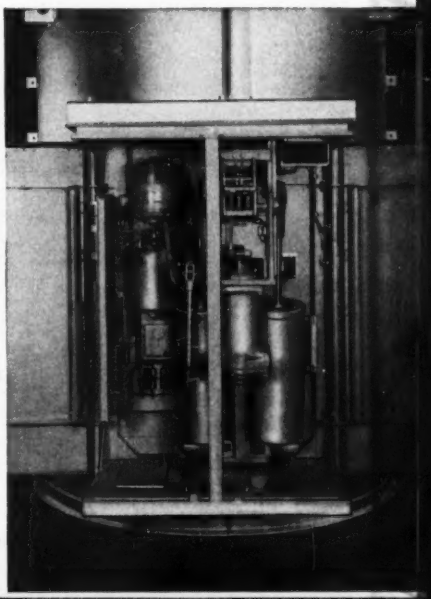
Design interrupting tests up to 9,620,000 kva were conducted on prototype circuit breakers at the Grand Coulee Switchyard in June, 1948.

Motor-Operated Main Mechanism

The opening and closing latches, the closing-energy system, oil-hydraulic decelerators, control circuits, and auxiliary switches are housed in dust-proof cabinet mounted on No. 1 pole. All operating forces are self-contained within compression tubes that surround pull rod and connect main and tank-top mechanism housings.

The velocity of any mechanism part (aside from the opening latch) does not exceed 8 ft. per sec. (the speed of a body falling one foot). Impact is thereby eliminated as a problem.

The mechanism is electrically and mechanically trip-free.



Main Operating Mechanism with doors open. Shows the two cylindrical housings that contain the closing springs, as well as motor, closing latch, and jack cylinder.

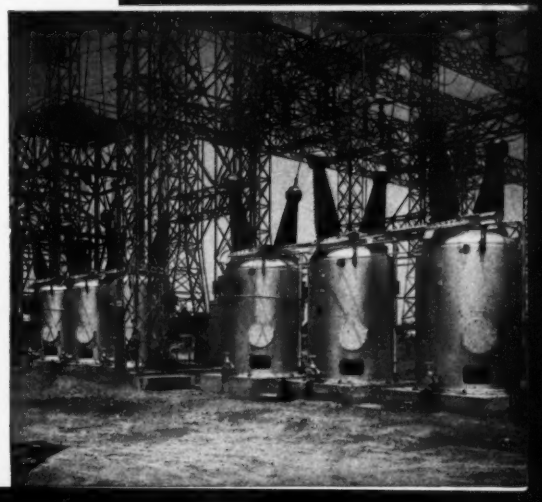
Opening Forces Externally at Tank Tops

Each pole has individual external kick-off springs that apply opening force directly to the crank arm of the rotating unit. For ease of inspection, all opening toggle linkage is also outside of the tank. A follow spring at end of pull rod on No. 3 pole completes the opening stroke that was started by the tank-top kick-off springs.

Emergency Manual Operation

Should control power fail, manual latch tripping provides a close-open or open-close-open sequence as necessary. If power remains off, two minutes operation of hand oil pump restores full operating energy.

Below: Two 196/230-kv Type RHE's on the line.



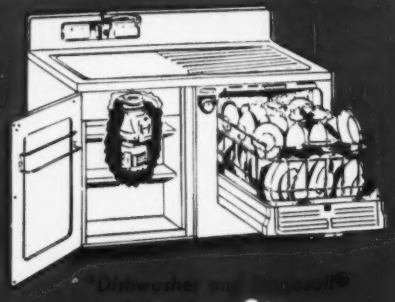
Advanced Design

Integral assemblies and multiple functioning of parts greatly simplify and reduce number of parts and adjustment points. Mechanical linkage interlocking eliminates need for an anti-pumping relay, and it permits reduction of the number of position-check switches to only one.

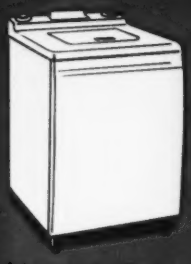
MFG. CORPORATION
P. O. BOX 419, GARY, INDIANA

Today is the time to Sell Tomorrow's Customer!

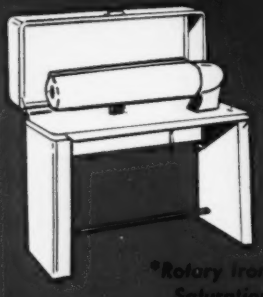
With an eye to the future, Hotpoint's effective promotion of *electrical living* is creating faster acceptance for major appliances now in the introductory stage.* This, plus the unprecedented number of today's *demand* appliances (ranges and refrigerators) being sold by Hotpoint, offers utilities load insurance for the future . . . when greater load and load balance will be needed.



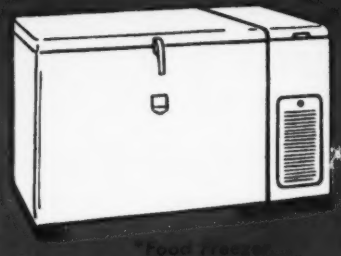
*Dishwasher and Disposall®
Saturation: less than 2%



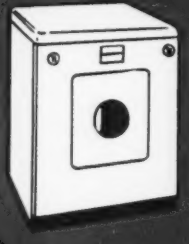
*Automatic Clothes Washer
Saturation: less than 10%



*Rotary Ironer
Saturation: less than 9%



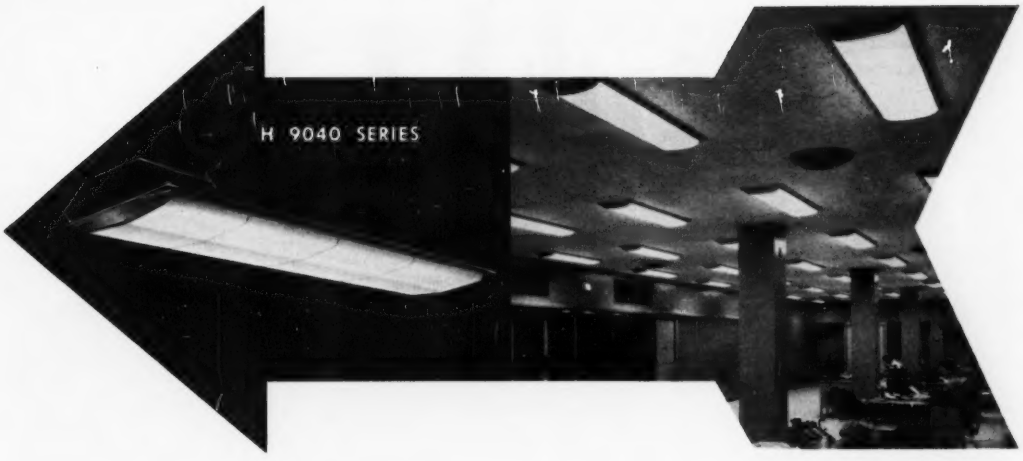
*Food Freezer
Saturation: less than 5%



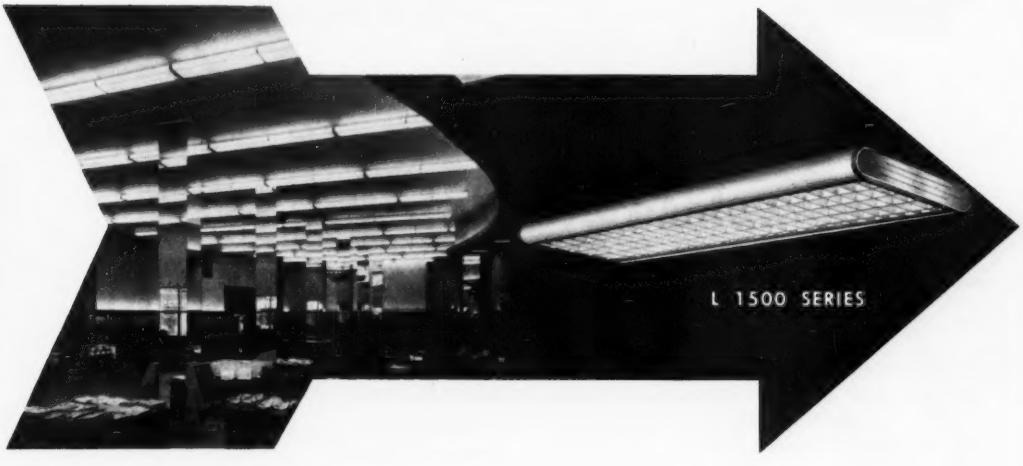
*Automatic Clothes Dryer
Saturation: less than 1%

LIVE ELECTRICALLY

UTILITY DIVISION
Hotpoint Inc.
(A General Electric Affiliate)
5600 West Taylor Street, Chicago 44, Illinois



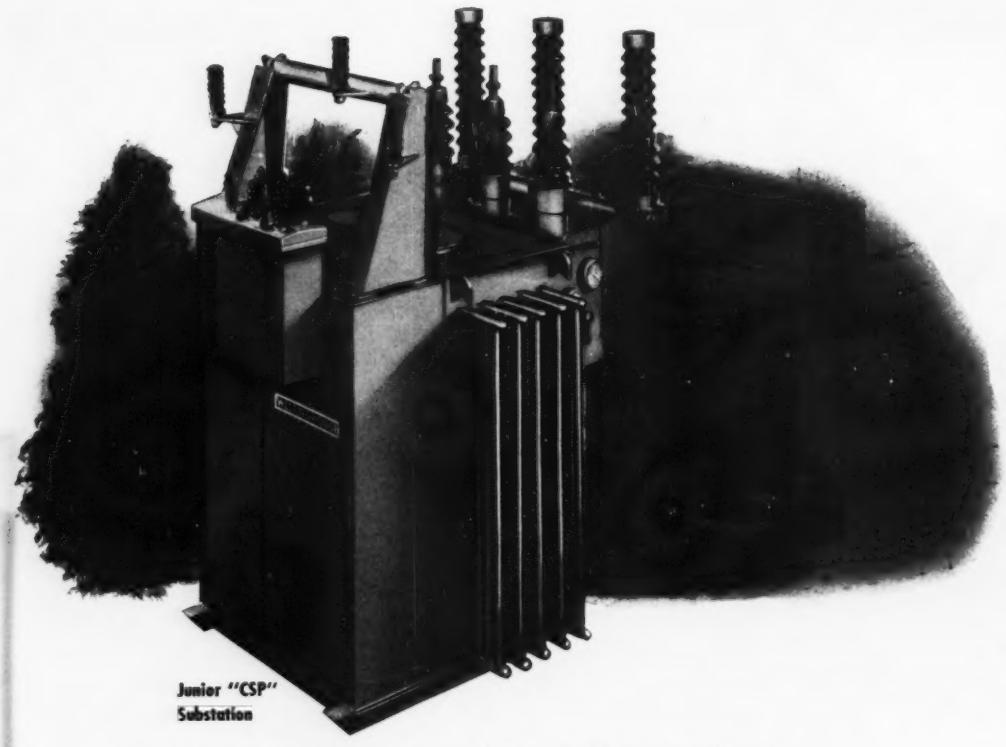
WHEREVER YOU GO...



THE BETTER LIGHTING INSTALLATIONS USE SUNBEAM LUMINAIRES

In San Francisco, Houston or Washington, D.C., you'll find lighting installations of high efficiency built around Sunbeam luminaires. Featuring a lighting fixture design for any and every lighting problem, the Sunbeam line is one of the most complete in the country. For complete information on the units shown, write:

SUNBEAM LIGHTING COMPANY • 777 EAST 14TH PLACE • LOS ANGELES 21, CALIFORNIA



Junior "CSP" Substation

A complete unit substation
—FOR SMALL CAPACITIES, too!

Here's a unit substation that answers small capacity needs. It's the Westinghouse Junior "CSP", a single-feeder substation that provides fast installation . . . greater flexibility . . . simplified maintenance . . . *at a much lower cost.* This new design is based on the principles proved in hundreds of larger rated "CSP" substations.

The Junior "CSP" (Completely Self-Protecting) Substation is completely factory-assembled, with integral high and low-voltage switchgear, and metering equipment. Thermal and lightning protection are both built in. It's ideal for rural lines, small towns and borderline areas where a larger rated substation is not justified.

Available in ratings from 300 to 1,000 kva . . . others to 3,000 kva. For further details contact your nearest Westinghouse representative, or write for Booklet B-4692, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-70583

YOU CAN BE SURE... IF IT'S Westinghouse

JUNIOR "CSP" POWER TRANSFORMER

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver.

You can't buy Better Fittings or ones that cost less to use

Cross Section Showing Indentations.

Quicker to use and neater in appearance, Briegel All-Steel Indenter Fittings not only make stronger connections but also make each job more profitable to the contractor and satisfactory to his customers.

Two Easy Squeezes and they're set to stay. It is only natural that the Briegel All-Steel Indenter Fittings are the most widely used E.M.T. connectors and couplings. Contractors the world over recognize their cost cutting qualities and the fact that they make each wiring job neater, stronger and better.

All B-M Fittings Carry the Underwriters Seal of Approval

BRIEGEL METHOD TOOL CO.

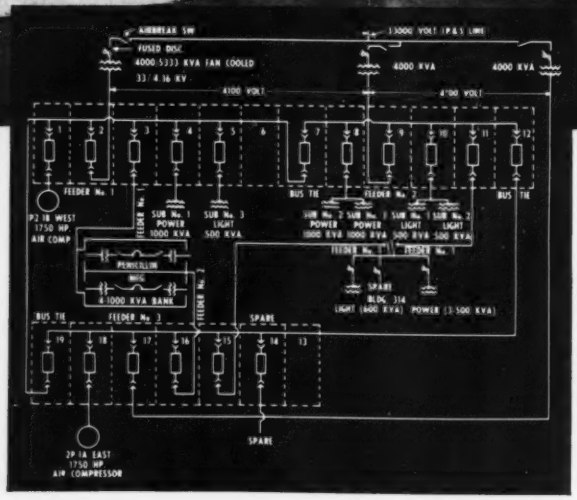
GALVA, • ILLINOIS

DISTRIBUTED BY

The M. B. Austin Co., Northbrook, Ill.; Clayton Mark & Co., Evanston, Ill.; Wagner Malleable Products Co., Decatur, Ill.; Clifton Conduit Co., Jersey City, N. J.; General Electric Co., Bridgeport, Conn.; The Steelduct Co., Youngstown, Ohio; Enameled Metals, Pittsburgh, Penn.; Kondu Mfg. Co., Ltd., Preston, Ont.

Lilly

Vital Drug by ALLIS-



Type JM 5 kv switchgear with DZ 100 B oil circuit breakers. Feeds power to complex equipment used in growing penicillin. This equipment includes 125 hp motors, compressors, electrical recording thermometers and timers.

At Eli Lilly's Kentucky Avenue plant, 33 kv is stepped down to 4160 volts through three 4000/5333 kva transformers to three DZ 100 B, 1200 ampere oil circuit breakers with overcurrent relays. Power flows in both directions to a secondary selective system through three 1200 ampere bus tie breakers. From here it is fed to the penicillin area, building 314, substations 1, 2 and 3 and to two 1750 hp air compressors.

Units 6 and 13 are bus tie auxiliaries for emergency use. Breakers protecting the air compressor have thermal, overcurrent and undervoltage relays.

Production Protected

CHALMERS SWITCHGEAR!

"Any power shut down is costly for us," say Eli Lilly and Company engineers. "It's imperative that we maintain *continuous* electrical service to prevent loss of raw materials and rapid deterioration of products in process." Their answer was 5 kv Allis-Chalmers switchgear to assure dependable circuit protection in their Indianapolis plants.

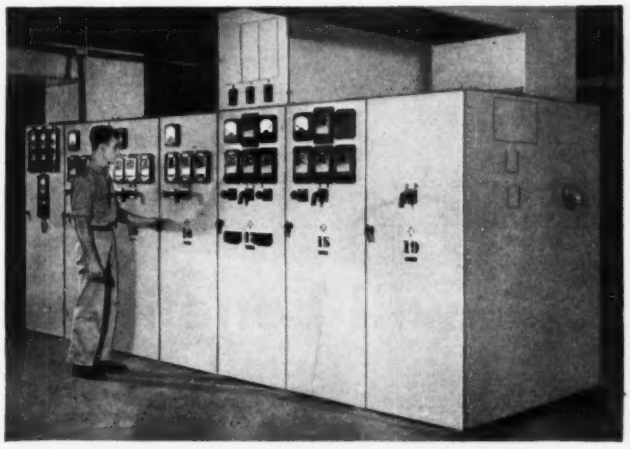
WITH LOSSES LIKE this at stake you can see why Eli Lilly engineers chose Allis-Chalmers switchgear to protect complex filtering, refrigeration, distillation, drying and heating operations.

In streptomycin production, for example, electric power is fed through standard switchgear for every stage of a 72 hour process . . . seeding, growing, fermentation and packaging.

"No maintenance to speak of" that's the A-C high voltage switchgear record at Lilly. 150,000 kva switchgear with *Ruptair* circuit breakers furnishes protection to the McCarty Street plant for liver, insulin and general pharmaceutical production.

At the Kentucky Avenue plant, Allis-Chalmers 250,000 kva, 4160 volt switchgear with oil circuit breakers controls power for production of ampules, antibiotics and general pharmaceuticals.

* * *



5 kv, 1600 ampere switchgear with DZ 100 B oil circuit breakers feeds power to the shipping department and streptomycin section of the Kentucky Avenue plant.

Is *yours* one of the many modern industrial plants that rely on standard Allis-Chalmers switchgear as essential to low cost, continuous plant operation? If not, it will pay you to investigate.

A-C switchgear is flexible. Standard units can be added as your load expands. *It's safe to operate.* Metal-clad construction is dead front for safety to personnel. Interlocks and automatic shutters protect personnel from high voltage parts and make it impossible to move the closed breaker to or from operating position.

Prefabricated, pretested, completely assembled, ready to operate when delivered! Furnished with air blast, oil or *Ruptair* circuit breakers.

See your local Allis-Chalmers sales representative or write for bulletin 71B6129D. A-3120

Ruptair is an Allis-Chalmers trademark.

ALLIS-CHALMERS, 939A SO. 70 ST.
MILWAUKEE, WIS.

ALLIS-CHALMERS

First in the U. S. with Metal-Clad Switchgear

LITTLE BOOK WINS BIG AUDIENCE!

SEE YOUR HOME IN A NEW LIGHT
22 Recipes for Better Living in a Better Lighted Home
WITH LIGHT CONDITIONING FOR ALL
Light Conditioning Recipe No. 7
READING, WRITING, DRAWING
Light Conditioning Recipe No. 9
GENERAL LIGHTING
Television Viewing

. . . will benefit your customers with "Light-Conditioning"

ALREADY, a million copies of General Electric's new lighting recipe booklet have been placed in the hands of the public. Offer of the booklet on the Fred Waring Television show, in spot radio commercials and magazine ads has produced many additional thousands of requests.

"See Your Home in a New Light" is sure-fire! Make the most of its tremendous appeal by using it to promote "Light-Conditioning" in your community. Prepared by General Electric home lighting specialists, the new book covers every major home lighting situation.

22 recipes give detailed information on lighting, such as exact measurements for lamp placement, for every purpose in the home.

General Electric is making the lighting recipe booklet available to electric service companies at nominal cost in any quantity you require for broad distribution. For full information and suggestions on methods of distributing it, call your G-E Lamp District Office. General Electric Company, Lamp Department, Nela Park, Cleveland 12, Ohio.

GENERAL ELECTRIC

With Factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities

You can *Save* space and *Reduce* inventories with TRIANGLE'S "DUAL-RATED"

This ONE WIRE will cover your RH *and* RW WIRE requirements

RH—RW?—forget them! Triangle's "Dual-Rated", Type RHW meets the physical and electrical requirements of each one of those types. Think of the money you can save on reduced inventories. Think of the space you save. Think of the confusion and headaches you avoid.

WHERE IT'S HOT— "Dual-Rated" is Underwriters' Laboratories approved as Type RH at 75°C., dry locations... **or**

WHERE IT'S WET— "Dual-Rated" is Underwriters' Laboratories approved as Type RW at 60°C., moist locations.

EVEN THOUGH IT'S BETTER TRIANGLE COSTS NO MORE!

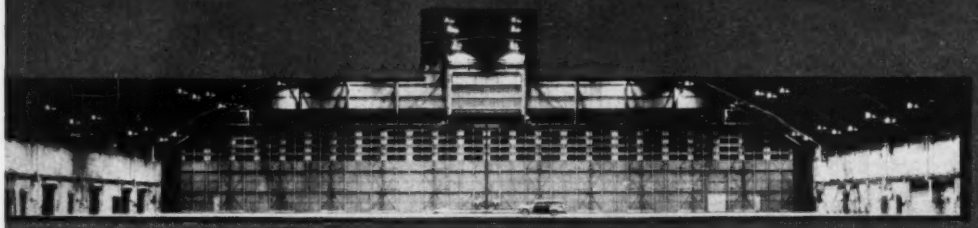
TRIANGLE IT MUST BE RIGHT

TRIANGLE CONDUIT & CABLE CO., INC.

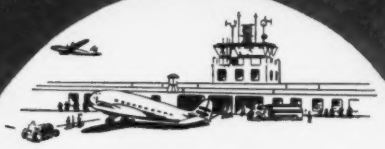
NEW BRUNSWICK, NEW JERSEY

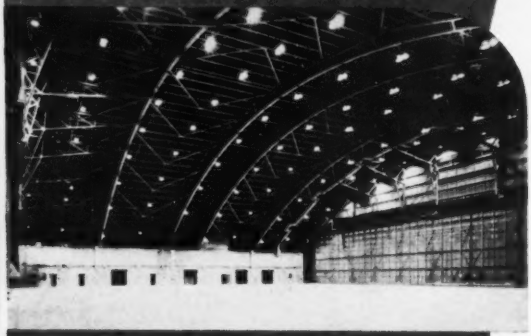
Glazon • Building Wire • Bare Wire • Armored Cable • Glazon Non-Metallic Sheathed Cable • Service Entrance, Service Drop, Varnished Cambric Braided or Leaded, Trioprene Trench, Power and Parkway Cables • Rigid Conduit Hot-Dipped Galvanized • Electric Metallic Thin Wall Conduit • Flexible Steel Conduit

Holophane gives the International Airport the Best-Lighted Hangars Ever Built . . .

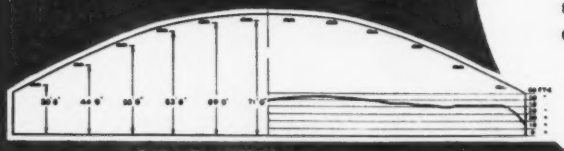


Hangars 3, 4, 5 at New York International Airport
Roberts & Schaefer Co. Engineers; Lorimer & Rose, Associate Architects;
Karvunsky, Weiler & Gooch, Consultants.





Interior Hangar No. 4.



Section, Hangar Lighting.

Holophane specifics are designed for many airport areas: Hangars, Waiting-Rooms, Administration Buildings, Restaurants . . . Repair Shops, Airplane Factories and all Outdoor Servicing Areas.

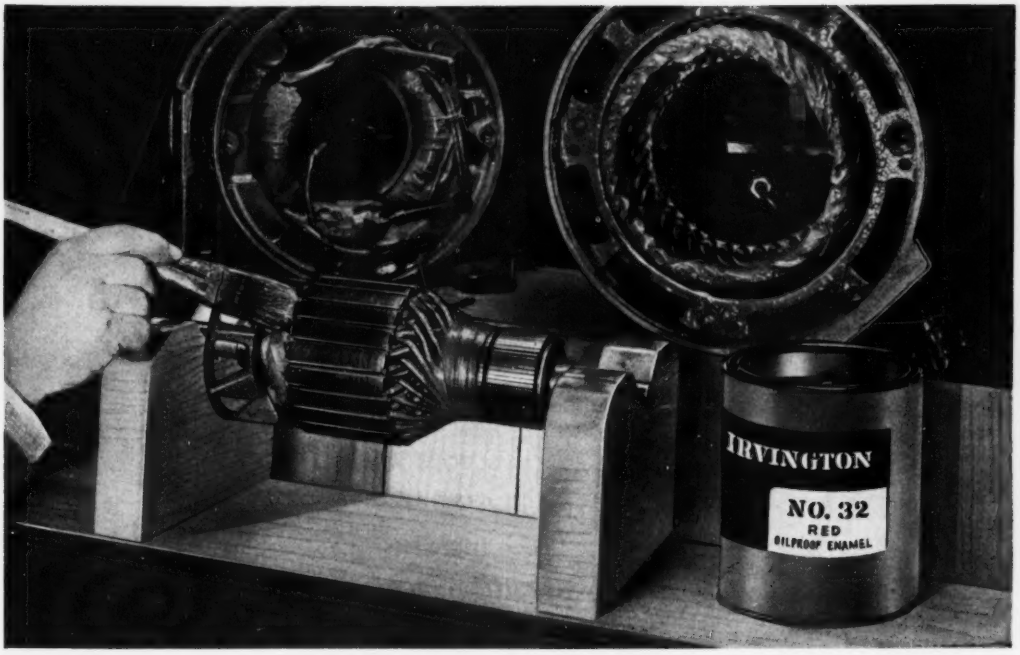
Selection of the lighting system in the hangars at "Idlewild" (New York International Airport) was made after exhaustive survey and cost analysis of airport lighting all over the country . . . Holophane combination mercury-incandescent lighting was chosen by the Port of New York Authority as the most effective, efficient and economical hangar illumination for this largest and most modern airport. The Holophane Engineering Staff will be glad to consult with engineers and architects, without charge, on any specific airport lighting project.

Holophane

HOLOPHANE COMPANY, INC.

Lighting Authorities Since 1898 • 342 MADISON AVENUE, NEW YORK 17, N.Y.

THE HOLOPHANE COMPANY, LTD., THE QUEENSWAY, TORONTO 14, ONTARIO



Here's the LOW-COST way to HIGH oil resistance

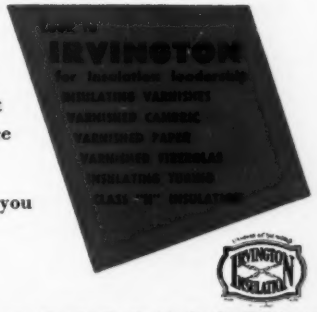
When insulation must have outstanding resistance to oil and grease, do the job the fast, inexpensive way—with Irvington No. 32 Red Enamel.

Irvington No. 32 Red costs less to *buy*—costs less to *use*. Just brush it on as the finish coat, over *any* type of insulation treatment. It is dry enough to handle in half an hour—completely dry in 8 hours.

With its dielectric strength of 800 volts per mil, the tough, adherent film gives a big plus in electrical protection—*along* with its resistance to oil, water, chemicals and abrasion.

Buy enough No. 32 Red at a time to be sure it's always on hand—you can store it without deterioration for long periods of time.

Send coupon today for free sample and technical data.



Irvington

VARNISH & INSULATOR COMPANY

Irvington 11, New Jersey

Represented in the Western States by C D. La Moree, Los Angeles, Berkeley, Seattle, Portland; Electric Motor Supply Co., Denver

EWe—2/51

Irvington Varnish & Insulator Company
6 Argyle Terrace, Irvington 11, N. J.

☐ Please send me technical data on your No. 32 Red Enamel.

☐ I'd like a free sample for testing.

Name..... Title.....

Company.....

Address.....

City..... Zone..... State.....

Cables run COOLER...
in TRANSITE DUCTS

. . . reducing copper losses

. . . increasing current capacity

. . . prolonging insulation life

HERE'S HOW to reduce copper losses . . . increase current carrying capacity . . . and prolong insulation life—run your cables in Transite* Ducts.

Current carrying capacities can be increased in a typical duct bank as much as 5%, or I^2R losses can be reduced 11%, for cables located in Transite as compared with other ducts used for power circuits.

And, Transite Ducts assure permanent duct banks because Transite is incombustible; is immune to rust and rot; is unaffected by electrolysis; will not slag under action of an arc, and will retain its high original strength.

An unusually smooth bore assures no injury to cable sheath, either in natural movement under load, or when pulling-in cables. Long, lightweight lengths can be quickly and economically installed. In addition, a full line of fittings simplifies even the most complicated of installations.

For full information on Transite Ducts, write for Data Book DS-410. Johns-Manville, Box 290, New York 16, N. Y.

JM

*Reg. U. S. Pat. Off.

How Transite Ducts increase current carrying capacities

Type cable 3 cdr. 500 MCM Compack Sector, 15 KV (6th Edition AEIC Spec.)
No. of cables—3 (all loaded in one bank)
Daily Load Factor—75%
Earth Temp. ambient—20 C

	Transite	Other
Total Therm. Res. to Dielectric Loss (C watts/ft.)	5.66	6.17
Total Therm. Res. to Copper Loss (C watts/ft.)	4.44	4.95
Temp. Rise from Dielectric Loss (C)	1.9	2.1
Allowable Rise for Copper Loss (C)	59.1	58.9
Allowable Watts per ft. cable	4.44	3.96
Allowable Current—(Amps. per cdr.)	386.	365.
Allowable Current—(Relative %)	105.6	100.

Johns-Manville *Transite Ducts* **"KORDUCT"— for encasement in concrete**

"CONDUIT"– for use exposed and underground without encasement

LOCKE

presents masterpieces of

insulator engineering

Tens of millions of

LOCKE SUSPENSION INSULATORS

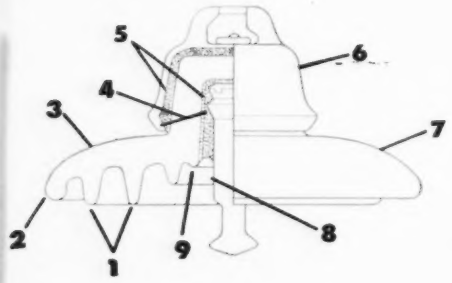
typified by

No. 1840

shown above . . . are in use on the world's high voltage transmission lines, some having been up since 1904. Certainly here is eloquent proof of their superior performance and broad acceptance. Specify them on your system.

Presenting **A MASTERPIECE OF INSULATOR ENGINEERING**

The LOCKE Suspension Insulator



LOCKE DESIGN gives you ALL these advantages

1. The contours of the corrugations are such as to give maximum resistance to mechanical impact consistent with total weight and balanced electrical characteristics. The depth of the corrugations assures full leakage distance and maximum impact values.

2. The heavy, reinforcing bead on the outer edge of the porcelain shell is an additional assurance against chipping.

3. Compression Glaze—a Locke development—assures high resistance to damage from thermal shock or mechanical impact. This means that Locke insulators can be handled faster in construction without danger of chipping or breaking.

4. The insulator arch is formed between the cap edge surface as the abutment and the stepped pin as the keystone. Thus while loaded in tension, the porcelain itself is working in compression and the best characteristics of all materials are utilized.

5. Locke Compression Sand at the cement joints adds to the strength, and the stability of that strength, throughout the life of the insulator.

6. Galvanizing is done by the exclusive Locke Permazinc process—a quality-controlled, double hot-dip method that assures the highest degree of resistance to weathering and corrosion.

7. The uniformly smooth glazed surface assures easy natural cleaning by wind and rain, and aids the insulator in maintaining its originally excellent electrical characteristics.

8. The large diameter of the pin extends beyond the cement line. This assures cement joints of minimum radial thickness, freedom from troubles arising from thick cement joints, and reduces leakage current concentration (with its resulting corrosion hazard) at this point.

9. This small barrier (petticoat) adjacent to the pin reduces leakage streamers and adds to pin life.

10. Since Fred M. Locke made the first wet-process porcelain insulator in 1893, a long list of Locke "firsts" has emerged: the first successful cemented type suspension insulator in 1904; the first switch insulator in 1909; the first radio-freed pin type insulator in 1932, to name but three.

YOU ARE EQUALLY SURE of masterpieces of design when you specify other products in the complete line of Locke Insulators and Suspension Hardware. Each pays off in superior performance on transmission and distribution lines, generating stations, sub-station and electrical apparatus.

LOCKE
INCORPORATED
BALTIMORE • MARYLAND

LOW VOLTAGE PIN TYPE INSULATORS

HIGH VOLTAGE PIN TYPE INSULATORS

SUSPENSION INSULATORS

SWITCH & BUS INSULATORS

SPOOL INSULATORS

GUY INSULATORS

LIQUID-FILLED BUSHINGS

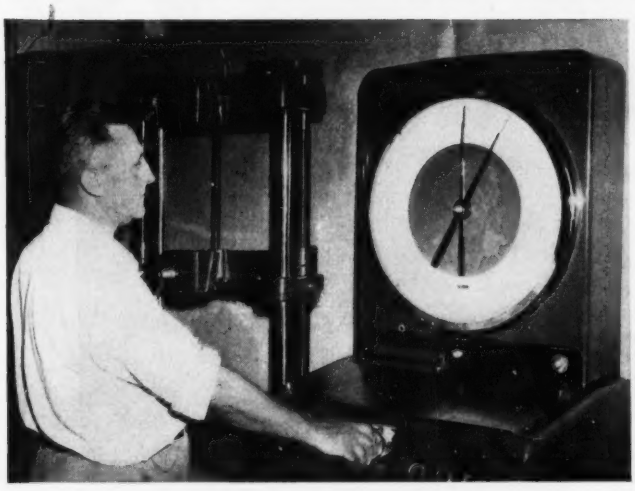
SUSPENSION & STRAIN CLAMPS

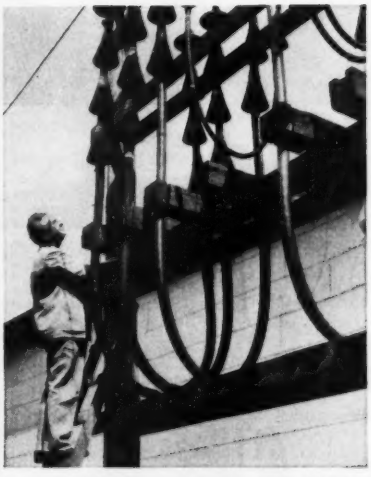
SUSPENSION HARDWARE

ENTRANCE BUSHINGS

Fine Engineering

protects the long life inherent in Kerite Cable





Sound, resourceful engineering development is a contributing factor to the technical superiority of Kerite Cable.

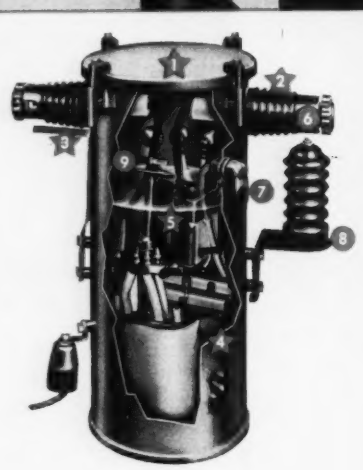
Never-ending research in Kerite's engineering laboratories produces new, better ways to protect cable; new types of cable and new ways to make use of time proven Kerite insulation. Fine engineering, conscientious workmanship, and proper handling combine to protect the long life that is inherent in all Kerite insulated cables.

Kerite engineers will be glad to help you with your cable problems, whatever they may be. THE KERITE COMPANY, 30 Church Street, New York 7, N. Y. Offices also at 122 S. Michigan Avenue, Chicago; 582 Market Street, San Francisco; 714 W. Olympic Blvd., Los Angeles.

DAYS KERITE

KERITE CABLE

Kerite Insulation—Your Cable's Best Life Insurance



1. Completely round tank and cover.
2. Extra rugged bushing with 2-way disconnect clamp and nonbreakable "Enrup" clamping knob.
3. Interchangeable, high-voltage, neutral bushing strap for wye system.
4. New "Coastal Finish" adds years of service life.
5. Inhibited Wemco C-I Oil life increased threefold.
6. Series air gap isolates arrester from line voltage.
7. New breaker handle with emergency control.
8. New wall-mounted, porcelain-clad De-ion arrester with high surge current capacity.
9. Tap changer handle located above oil level.

"CSP" Transformer RW Tank
5,000 volts and below
100 kva and smaller

They're NEW!

5 More Features that cut maintenance

Five great improvements in the Westinghouse "CSP®" Transformer:

1. **New round tank**
2. **New high-voltage bushing**
3. **Simplified stocking**
4. **New "Coastal Finish"**
5. **Inhibited Wemco C-I Oil**

Now the "CSP" Transformer cuts distribution costs even more. Like all Westinghouse "CSP" (Completely Self-Protecting) Transformers, the new Model "RW" has both thermal and lightning protection built in.

★ **The completely round tank** provides the most effective seal possible . . . allows more free working space between transformer and pole.

★ **New rugged high-voltage bushings** are 3 times stronger . . . leads are easier to connect and tighten with nonbreakable "Enrup*" clamping knob.

★ **It's convertible.** Stock only Class B-1 transformers for wye systems with a spare supply of arresters. To convert to Class A for Delta systems, remove the neutral bushing strap and replace with a high-voltage De-ion® arrester.

★ **New "Coastal Finish"** provides greater resistance to chalking, cracking and rust. More than doubles protective life of the finish . . . adds years of service before repairing and repainting.

★ **New Wemco C-I (Inhibited) Transformer Oil . . .** greatly increased service life. Low viscosity . . . freedom from acids, alkali, corrosive sulphur and sludging . . . and resistance to emulsification are all maintained at least 3 TIMES LONGER.

Meets ASA and EEI-NEMA standards. Available with cover-mounted bushings, in ratings above 5,000 volts, 100 kva and smaller.

Westinghouse Distribution Transformers are also available in conventional models. For further information call your Westinghouse representative, or write for DB-46-100 "CSP" Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-70582

*T. M. Reg. U. S. Rubber Co.

YOU CAN BE SURE . . IF IT'S

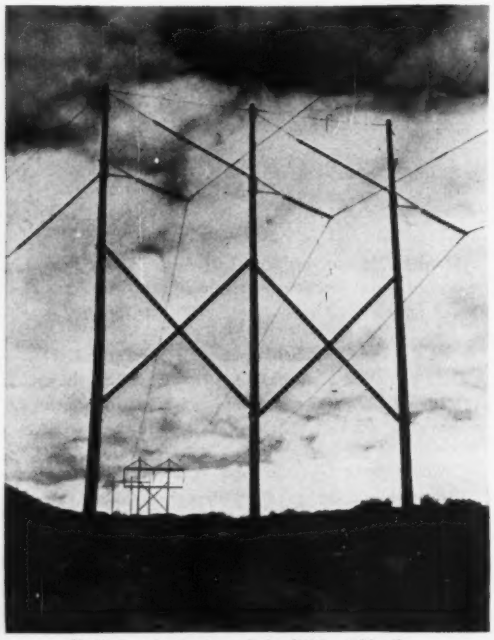
Westinghouse

"CSP" DISTRIBUTION TRANSFORMERS

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver.

Demand PROOF OF PERFORMANCE

for Superior Insulator Quality



Medium-angle structure of the 230-kv, 189-mile line of Idaho Power Company.

● Not long ago, Idaho Power Company built a 230-kv line extending 189 miles across southern Idaho. For this line, they wanted only the best of insulators.

RESULT: For use on their new line, The R. Thomas & Sons Co. was awarded a contract for 40,000 "*Quiet-Type*", 10-inch suspension insulators. Recently, 3000 more were purchased.

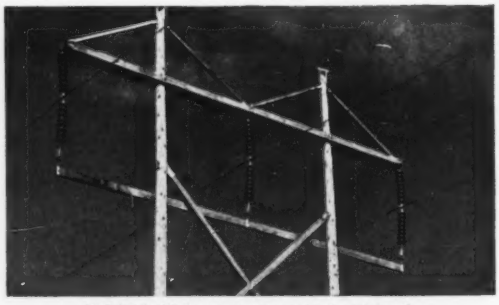
Thomas engineers pioneered the under-glaze process resulting in the radio noise-free porcelain insulator (Patent No. 2154387). Service records*, line and laboratory tests prove the superiority of "*Quiet-Types*" over conventional insulators.

After all is said . . . it's still quality that counts plus proper designing, precision manufacturing . . . and PROOF OF PERFORMANCE. Since the beginning of the Electrical Industry, Thomas has been supplying porcelain for the most difficult insulation problems. Why gamble?

*Available upon request.

SPECIFY THOMAS INSULATORS—THE BEST BY LINE TEST

— *Since 1873* —



230-kv hold-down structure designed by the Engineering and Planning department of Idaho Power Company.

The R. Thomas and Sons Co.

LISBON, OHIO

NEW YORK CHICAGO

Sales Representatives: E. B. Anderson Co., *Detroit* • Paul Berry, *Oklahoma City* • Ken H. Best, *Seattle* • Butler & Land, *Dallas* • Hugo Sales Company, *Minneapolis* • R. E. Cunningham & Son, *Los Angeles* • Electric Supply Co., *Albuquerque* • Engineer Sales Corp., *St. Petersburg* • R. F. Hamilton & Associates, *Denver* • Geo. E. Honn Company, *San Francisco* • Leiser & Company, *Philadelphia* • Lynn Elliott Company, *Houston* • John G. Pettijohn Company, *Knoxville* • Redmond Supply Co., *Phoenix* • J. F. Schaefer & Co., *Kansas City* • R. J. Sullivan & Company, *Boston* • E. E. Torkell, *Memphis* • Triangle Electric Supply Company, *El Paso* • Joe Williams, *Little Rock* • *Representatives in other principal cities*

STANDARD ENGINEER'S REPORT

DATA

LUBRICANT Calol Multi-Service Oils

UNIT Compressor cylinders - 30"x20" parallel

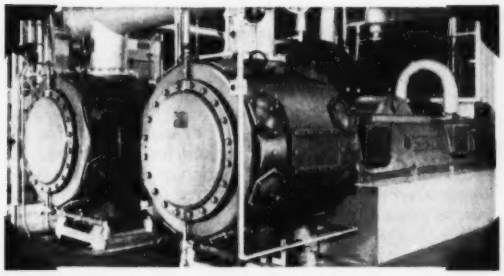
LUBRICATOR Force-feed

CONDITIONS Furnishes furnace stack draft and compresses flue gas—high chemical content

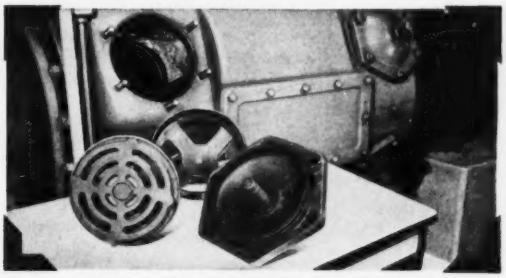
PERIOD 2 years

FIRM Pure Carbonic Co., Berkeley, Calif. (A Division of Air Reduction Co., Inc.)

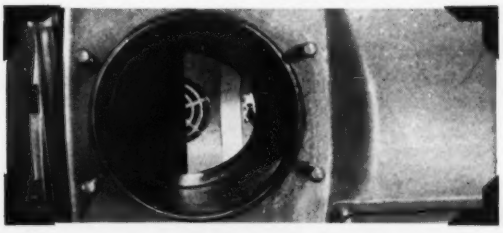
Special oil cuts wear in compressor handling corrosive gas



CALOL MULTI-SERVICE OIL 55X held wear down in these thirty-inch compressor cylinders to an average of only 0.0015 inch in two years, although they handle only raw flue gas. This is part of Pure Carbonic Company's process for producing CO_2 to make "Dry Ice."



OXYGEN, NITROGEN, SULPHUR and carbon dioxide are some of the chemicals in the millions of cubic feet of flue gas from furnace stacks that go through the compressor in a day. A valve has been removed showing where deposits from corrosive elements may accumulate.



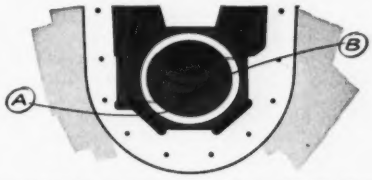
PORTION OF A CYLINDER, seen through a valve port, shows how CALOL Multi-Service Oil 55X keeps walls clean and lubricated. It withstands the highest operating temperatures, keeps a uniform lubricating film on all surfaces and is especially resistant to lacquer formation.

REMARKS: The compressor pictured here is an Ingersoll-Rand Type XPL. (30X20" Compressor Cylinders; 13x20" Steam.) The gas it handles in 24 hours produces 120,000 pounds of liquid carbon dioxide. CALOL Multi-Service Oil 55X lubricates the journals and crankpins as well as cylinders. There are grades of CALOL Multi-Service Oil to meet conditions in all types of compressors.

CALOL

Trademark "CALOL" Reg. U. S. Pat. Off.

How CALOL Multi-Service Oil cuts costs in all types of compressors



In crankcase and on cylinders, CALOL Multi-Service Oil reduces oil consumption -- has cut consumption 20% in air compressors.

A. Oxidation-resistant compounds prevent formation of varnish. Detergent keeps contaminants suspended in oil, prevents foam.

B. Special compound assures "hot-spot" lubrication ... covers surfaces rapidly.

CALOL Multi-Service Oils also recommended for pumps, diesel engines, enclosed gears.

STANDARD TECHNICAL SERVICE checked this product performance. If you have a lubrication or fuel problem your Standard Fuel and Lubricant Engineer or Representative will give expert help; or write Standard of California, 225 Bush St., San Francisco 20.

STANDARD OIL COMPANY OF CALIFORNIA

PRODUCT NEWS

Voltage Sensitive Control for Switching Capacitors

(1) Line Material Co., Milwaukee 1, Wis.

The type VSA voltage-sensitive switch control will operate to connect automatically banks of capacitors to an electrical system when they are needed and disconnect them when their effect may become undesirable.

Although originally designed for use with the Kyle type GR switch for either single- or 3-phase switching, this control can be adapted, by use of additional external relays, to most solenoid or motor-driven circuit breakers and switches generally available.

The new control consists of a contact-making voltmeter, selector relays and an adjustable time delay unit. Also provided are a fuse for control circuit protection, potential test terminals for connection of an external voltmeter, toggle switches providing manual control of the device or devices being controlled, a means of minimizing contact erosion and a means of eliminating radio interference. It is designed for operation from a 120-volt, 60-cycle a-c source obtained from the line to be controlled. The desired nominal line voltage can be adjusted between 110 and 130 volts. Recommended minimum band width for this particular instrument is 3 volts, maximum band width obtainable being 12 volts.

For operation, the master element, the contact-making voltmeter, is connected to the line and, when the voltage drops to a predetermined point, a pair of contacts on the voltmeter close, passing an electrical signal through the auxiliary equipment of the control (after an adjustable time delay) to the driving motor of the switch. The motor closes the switch, connecting the capacitors to the line and produces the desired correction at the most appropriate time. As the load drops off, the voltage rises to another predetermined point, causing the contact-making voltmeter to close a second circuit similar to the closing circuit. As a result, the switch opens, disconnecting the capacitors from the line, thus preventing an over-voltage to exist because of capacitors.

For Additional Information
Fill in the Postcards on Page 55

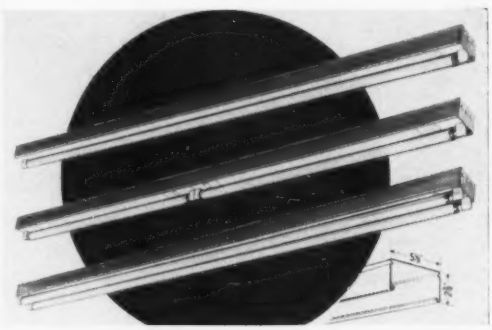
Outdoor Current Transformer

(2) Allis-Chalmers Mfg. Co., 939 S. 70th St., Milwaukee, Wis.

This new outdoor current transformer, type KO, can be mounted horizontally, vertically or inverted. It was built for high accuracy in metering and heavy-duty relay application, according to the manufacturer. Both primary leads are brought out to blade-type terminals through a single porcelain bushing having a generous creep surface.

The welded case is pressure tested and hermetically sealed. Maximum insulation strength is obtained by compound filling under a vacuum-pressure process claimed to entirely eliminate air voids and result in low power factor and a maintenance-free installation.

This current transformer is available in standard ratings up to and including 800 amp. and through voltage classes 5, 8.7 and 15 kv.



Fluorescent Lighting Equipment

(3) Curtis Lighting Inc., Dept. B-16, 6135 W. 65th St., Chicago 38.

For exposed or concealed lighting applications, Mogul fluorescent Curtistrip was designed to supply a wire channel large enough to accommodate ballasts for operating all slimline, starter-type and low-brightness fluorescent lamps. The cold-rolled steel wire channel is 5⅛ in. wide by 2⅞ in. deep and is available in 4-, 5-, 6-, 8- and 10-ft. lengths. Continuous lines of any length may be made by use of a steel channel coupling. Single- or twin-lamp operation is offered. All parts that go to make up the complete unit may be purchased separately.

The trend is to QUALITY in lighting equipment

ILLUMINATION EQUIPMENT
SMOOT-HOLMAN
INGLEWOOD, CALIFORNIA ®
MADE IN U.S.A.

—MEANS TOP QUALITY ALWAYS!

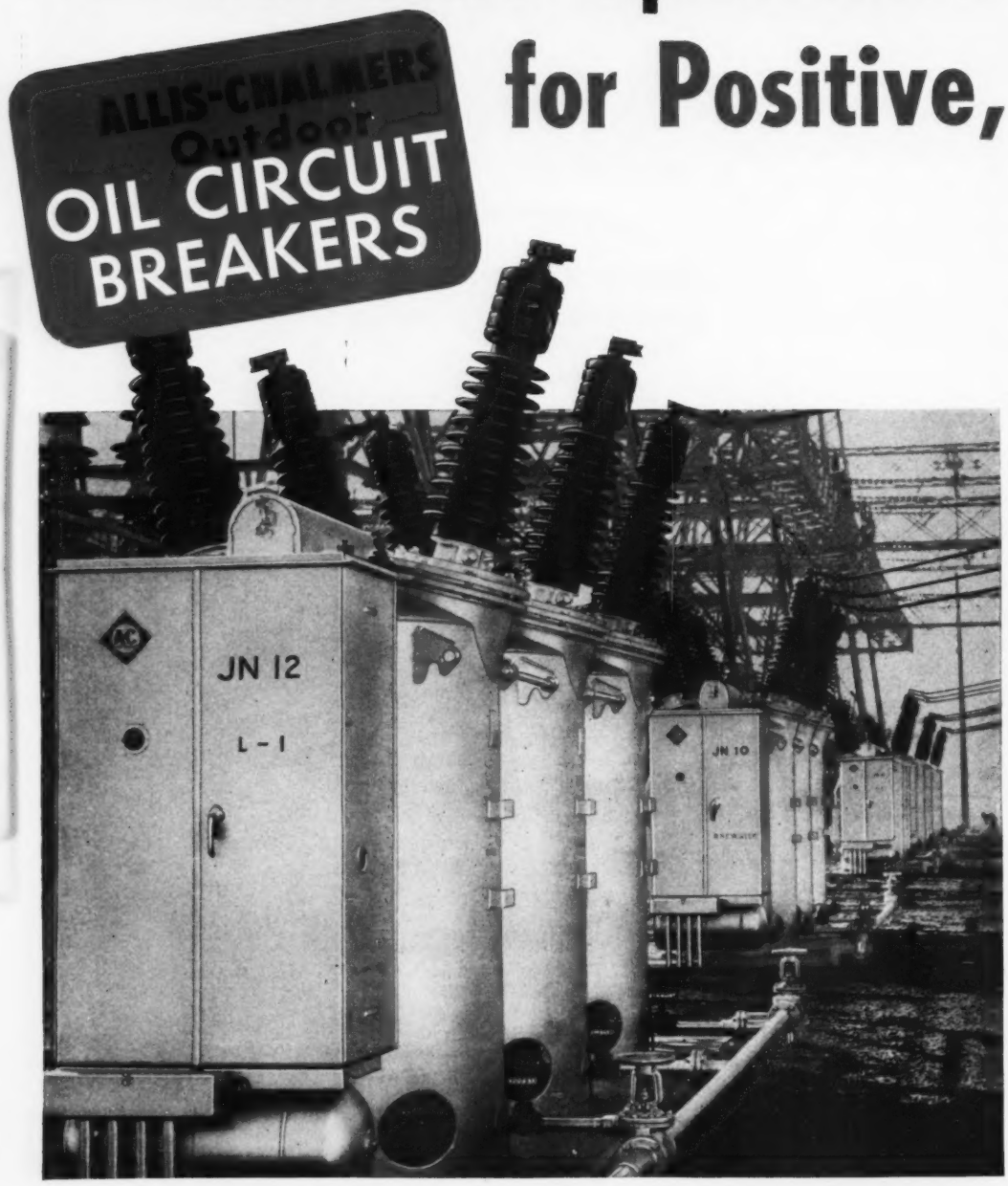
new

This is the new 'low heat' Ceiling-Lite designed to comply with recent Underwriters' Laboratories requirements effective January 1, 1951. Made in three sizes —

No. LH-1110 — 10" glass
Approved for 200 Watts
No. LH-1112 — 12" glass
Approved for 300 Watts
No. LH-1114 — 14" glass
Approved for 300 Watts

SMOOT-HOLMAN COMPANY Inglewood, Calif. Offices in Principal Western Cities • Branch and Warehouse in San Francisco

Pneumatic Operators for Positive,



Type BZO-160 floor mounted, outdoor oil circuit breakers like these can be furnished in ratings from 69 kv to 230 kv, up to 10,000,000 kva interrupting capacity. Mechanically trip-free pneumatic operation is a standard feature in all of these sizes.

Mechanically Trip-Free Dependable Operation

★ TRIPPING RELEASES CONTACTS FROM CLOSING MECHANISM
★ POWERFUL ACCELERATING SPRINGS FORCE CONTACTS OPEN

WHEN A SEVERE storm or other abnormal condition disrupts your system, you need full protection against damage to your generators, transformers and other electrical equipment. But unless your breakers are mechanically trip-free there's a chance they may fail to reopen if they are reclosed against a fault condition.

Opening action of Allis-Chalmers breakers is immediate and positive because tripping positively uncouples contacts from the closing mechanism. Opening occurs whether the breaker is in normal closed position or is "closing in" on a short circuit.

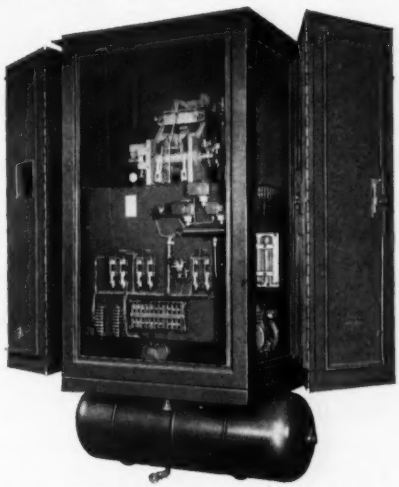
Allis-Chalmers mechanically trip-free design is your guarantee of dependable breaker operation. Breaker opening is independent of the closing piston and air valves. Maintenance closing devices cannot prevent the breaker from opening. There is no drag from the closing mechanism. These important advantages are included with every Allis-Chalmers power circuit breaker — whether pneumatic, solenoid or manually operated.

Designed for high speed reclosing, Allis-Chalmers circuit breakers combine fast-acting power of pneumatic operation with fast recoupling of contacts and reclosing mechanism.

Mechanically trip-free A-C circuit breakers are proving their dependability every day in utility and industrial applications across the country.

Call your Allis-Chalmers sales office for more information on power oil circuit breakers, and for a list of satisfied customers in your area. Or write Allis-Chalmers, Milwaukee 1, Wis., for new bulletin on the mechanically trip-free pneumatic operator. A-3230

Unitop is an Allis-Chalmers trademark.

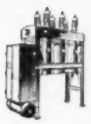


WEATHERPROOF HOUSING with overhanging top protects the operating mechanism. Each housing includes a complete automatic air system, space heaters, electrically trip-free control system and air tank. Two double swinging doors provide access on three sides. Doors have a large safety-glass window that makes inspection easier. They can be padlocked with heavy duty latches. Ventilating louvres in doors exclude dust and insects.

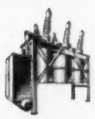
ALLIS-CHALMERS

A-C ALLIS-CHALMERS

MECHANICALLY TRIP-FREE PNEUMATIC OPERATOR IS STANDARD EQUIPMENT ON ALL THESE ALLIS-CHALMERS OUTDOOR POWER OIL CIRCUIT BREAKERS



Type FZO-150 *Unitop* breaker 14.4 to 46 kv, 8-cycle opening, 20-cycle reclosing*



Type FZO-151 . . . 69 kv, 5 or 8-cycle opening, 20-cycle reclosing*

Type BZO-160 . . . 69 kv, 8-cycle opening, 115 to 230 kv — 3 or 5-cycle opening with 20-cycle reclosing*

*20-cycle reclosing standard for 600 and 1200 amp breakers

3-kw. Central Station For 2-Way Radio Systems

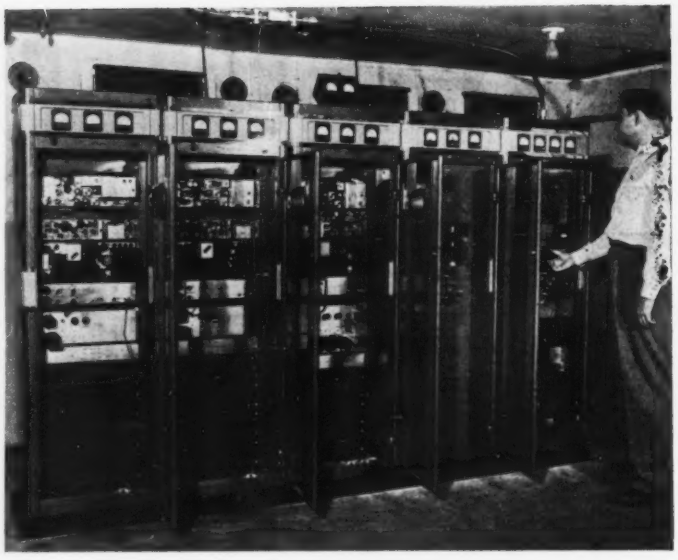
(4) Motorola, Communications and Electronics Division, 4545 W. Augusta Blvd., Chicago 51.

A remotely controlled 2-way radio central station with a continuous output of 3 kw. is capable on intermittent operation of 5-kw. output.

Three of the stations have been installed for the National Park Service near Olympic National Park in Washington. Built as repeater stations, the units form communication links between Port Angeles, Wash., and U. S. park rangers in 2-way radio-equipped cars or trucks, or carrying portable radiophones.

Any incoming signal on one of the frequencies used will activate automatically the 3-kw. transmitters from which the signal will be rebroadcast.

The high-power station is built in three individual cabinets to facilitate ease of handling and maintenance. The exciter cabinet houses a Sensicon receiver and a 60-watt transmitter that serves as the driver for the 3-kw. amplifiers. The second cabinet contains the high-voltage power supply, screen supply and relay and control circuits. The third cabinet has the power amplifier, consisting of a pair of 4-1000A tetrodes in a push-pull circuit. Tubes are forced air cooled.



Provision is made for automatic switch-back to 60 watts "on the air" operation in event of power amplifier overload or during periods of maintenance on the high-voltage power supplies and final amplifier. In case of momentary overload, the unit is automatically switched back to the low-power section for the duration of the particular transmission. On the next transmission the unit returns automatically to 3-kw. operation. High-voltage interlocks and shorting switches are provided for protection of operating personnel.

The new equipment is manufactured for terminal or repeater station operation and may be remotely or locally controlled. Units may be licensed for state police, park service and other government units.

Hook-Up Wire

(5) Rome Cable Corp., Rome, N. Y.

A new high-temperature, space-saving radio and television hook-up wire with an 8-mill wall is insulated with Rome Synthinol 901, a thermoplastic compound, plus nylon sheath or lacquered braid; is Underwriters' approved for continuous operation at 90°C., above or below the chassis in approved applications.

The new tinned conductor is available in even sizes from No. 16 to 24 inclusive, with over-all diameters ranging from .100 in. for the No. 16 to .051 in. for the No. 24. It comes in a range of colors and is claimed to have such advantages as increased resistance to heat deformation, excellent heat aging properties, increased resistance to oils, chemicals, greases, moisture and flame, clear permanent colors, improved solderability, improved space factor. All data are contained in manufacturer's bulletin TR-901.

Insulation Tester

(6) General Electric Co., Apparatus Dept., Schenectady 5, N. Y.

An instrument for electrical testing of insulating materials, the Current Limited High-potential tester, is designed for electrical manufacturing plants and service shops. It can be used in testing insulation of electrical components and assemblies such as coils, relays, motors and appliances.

Varying Load Needs in One Water Heater Unit

(7) Westinghouse Electric Corp., 306 Fourth Ave., Pittsburgh 30, Pa.

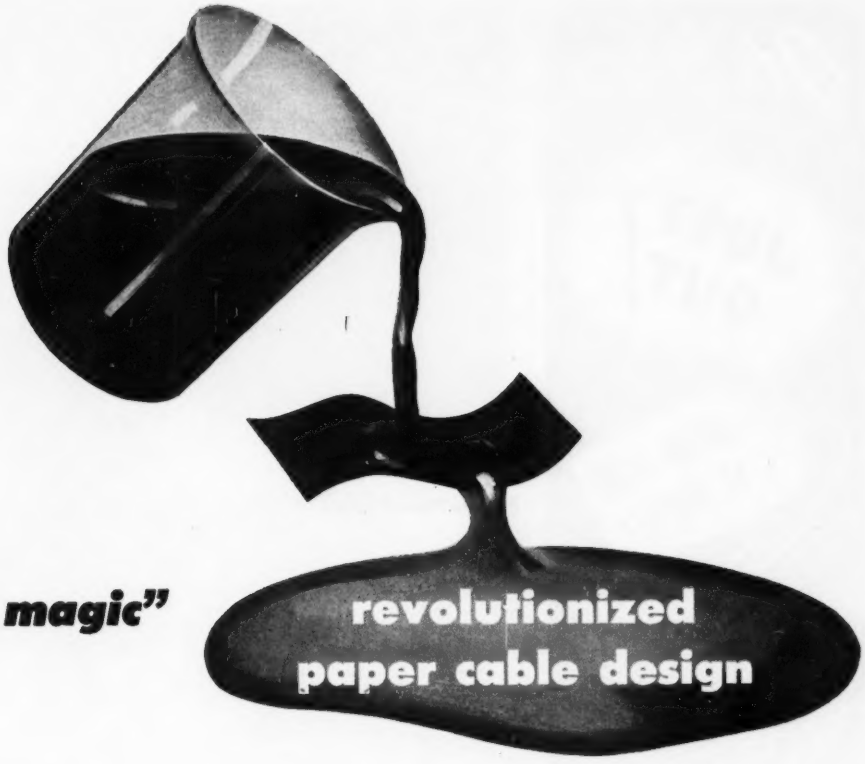
Element ratings on a new water heater can be changed to required wattages between 600 and 3,000 watts by shifting wiring connections. According to the manufacturer, the new element makes it possible for distributors and dealers to supply heaters of various wattages without carrying a large stock. The Corox multi-wattage heating element is sickle-shaped and has four terminal screws. By changing or omitting jumpers the wattage can be set to comply with utility specifications. Wattages that can be obtained by altering terminal connections are 650, 750, 1,500, 2,000, 2,500 and 3,000 watts.

Outdoor Service Unit

(8) Heinemann Electric Co., Trenton, N. J.

This special-purpose unit consists of magnetic circuit breakers and receptacles. The receptacles are wired in so that the only connections required are those directly to the line. This equipment is available with one to four fully magnetic breakers in combination with one or two receptacles. Ratings are supplied in any combination up to 50 amp.

Fill in the Postcards on Page 55



how "black magic" revolutionized paper cable design

Everybody knew that in paper cable the oil deteriorated under heat and electrical stresses.

But recalling that carbon black can purify oil and tends to stabilize it, Anaconda cable research men asked themselves why it couldn't do the same in paper cable.

They found it could and did!

Today ANACONDA Type CB* (Carbon Black) Power Cable offers the best power cable service that money can buy.

Not only does it contain carbon black, but also it can be made with resilient binder and sheathed with F-3**, the superior ANACONDA Alloy-Lead Sheath that is so resistant to slow-bending fatigue, creep, burst, abrasion, vibration and aging.

Net result: you get maximum cable life and economy.

Want more facts? Proof? Ask your nearest Anaconda Sales Office. Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

61247

*CB—Carbon Black
(U. S. Patent 2,102,129)
Reg. U. S. Pat. Off.
**F-3—Arsenic-Lead Alloy
(U. S. Patents 2,300,788 and 2,374,755)
Reg. U. S. Pat. Off.

Anaconda on the Pacific Coast
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For easy selection, brushes are pictured and arranged in groups showing styles with dimensions—a time saver when making brush replacements. Write for your copy.
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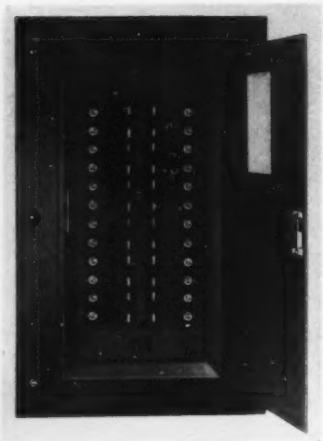


Fusible Panelboards

(9) Square D Co., 4335 Valley Blvd., Los Angeles 32, Calif.

New NTPR panelboards provide plug fusible branches with heavy-duty toggle switches for lighting and appliance branch circuit control. The panelboards are available from 4 to 20 circuits for use on a-c or d-c; they carry Underwriters' approval.

Construction features include a box 17 in. wide and 4¼ in. deep, with 4-in.-wide wiring gutters. Ample knockouts are provided in ends and sides, the manufacturer states. Four branch circuits are contained in the 1-piece molded bakelite blocks that comprise the heart of the panelboards.

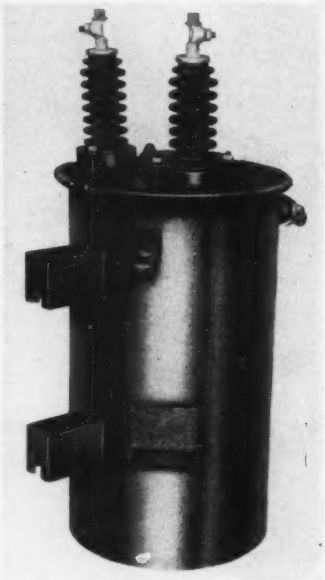
Radiation Detection Meters

(10) Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

A radioactivity measuring instrument, the Universal Roentgen Meter, is claimed to be sensitive enough for use in X-ray work and also to measure accurately large amounts of radiation encountered in atomic fission research.

The meter is the measuring part of radiation detection devices that reveals radiation, expressed in milliroentgens, that the device detects. A roentgen is the basic measuring unit of alpha, gamma and beta rays, which may be produced by an X-ray machine, a piece of radium or an atomic bomb explosion.

The Universal Roentgen is equipped with multiple scales, either four, five or six, that make possible fine readings in all ranges of radiation. The 4-scale model covers four ranges of radiation: zero to half a milliroentgen; zero to 5 milliroentgens; zero to 50 milliroentgens; zero to 500 milliroentgens. Setting a switch determines which of the multiple scales will operate and be visible.



Sealed Transformer Tank Construction

(11) Wagner Electric Corp., 6400 Plymouth Ave., St. Louis 41, Mo.

A new method of fastening cover to tank on form W distribution transformers provides true sealed tank construction, according to the manufacturer. The Shur-Seal cover clamp consists of a ring of V-shaped cross section that fits over the edge of the cover and lip of the tank. This ring is tightened by means of a single bolt. The pressure exerted is equal at all points, so that the cover gasket is uniformly compressed to form a positive seal between cover and tank. No "breathing" can take place, it is claimed, and there is no danger of oil leakage during shipment or handling. Drainage channels prevent water from accumulating on the cover.

The manufacturer's form W transformers are now being filled with inhibited oil to reduce oxidation. Form W is the designation of Wagner distribution transformers having cores of cold-rolled oriented grain steel. Features claimed are small size, light weight and excellent performance.

"DIRECT HEAT"

Watthour Thermal Demand Heater

fits standard meter installations

I-50 features

low watt loss

low maintenance

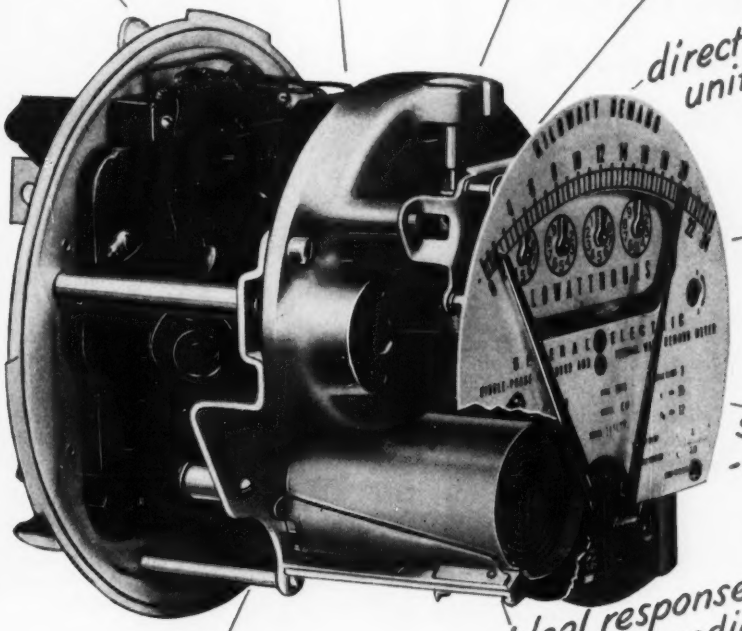
direct heat thermal unit gives high efficiency

high torque (2300 g.mm. full scale)

stable pointer - no overshoot

ideal response time easily predicted

shortens testing time



TYPE IHM-WATTHOUR THERMAL DEMAND METERS—for more information, call your nearest G-E representative today or write for bulletin GEC-408. Apparatus Department, General Electric Company, Schenectady 5, New York.

601-48

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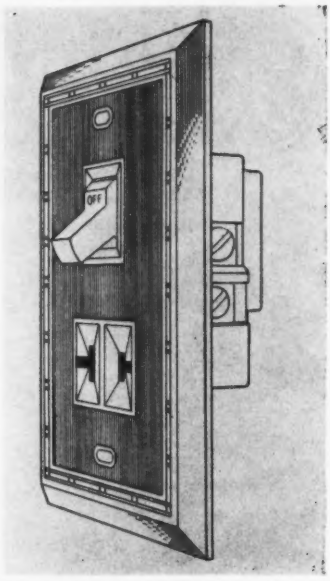


Combination Switch, Outlet, Wall Plate

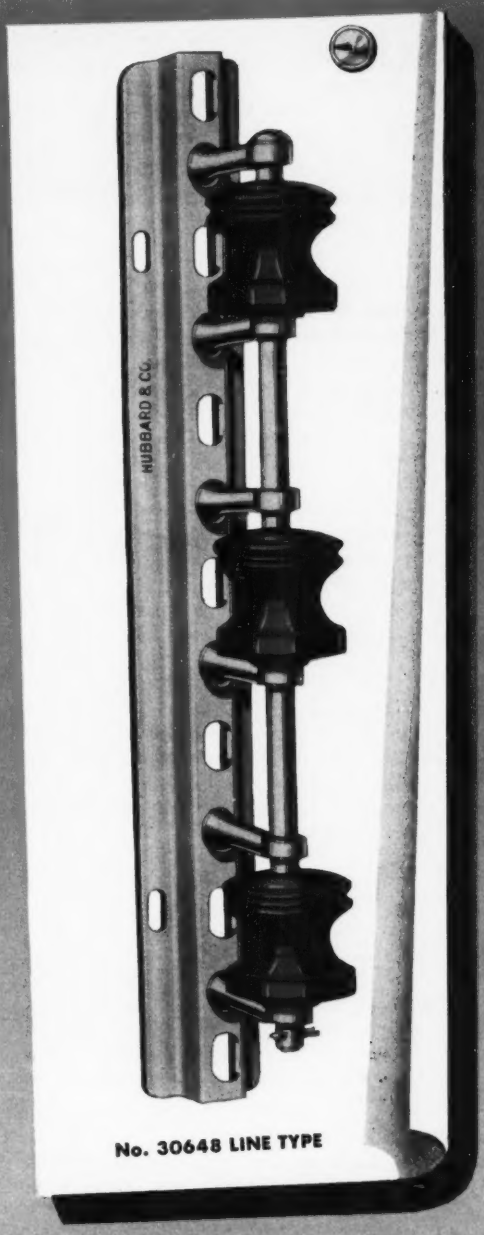
(12) John Paulding, New Bedford, Mass.

A 3-in-1 unit, molded from high-impact bakelite, combines a single-pole T-rated switch, outlet and wall plate. Switch and contacts are enclosed in a dust-proof housing. The device fits any standard outlet box, is claimed to be easy to wire and simple to install. It is Underwriters' approved.

The T-slotted receptacle has double-wipe phosphor bronze contacts. Large brass binding screws are for side wiring and will take No. 8 wire. Extra long bakelite toggle and a positive action switch are provided.

(13) STREET LIGHTING—A new type AK-6 enclosed street lighting luminaire for residential, rural and suburban areas (1,000 and 2,500 lumen lamps) is available from Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa. Standardized variations meet requirements for top or side mounting, inner or outer wiring, and high- or low-voltage multiple circuits.

(14) COUNTER—New Universal 6-in-1 precision frequency and time measuring equipment has been announced by the Potter Instrument Co., 115 Cutter Mill Road, Great Neck, N. Y. Designated as model 801, the instrument may be used for frequency measurements, time interval measurements and frequency ratios and also may be used as a secondary frequency standard, a 1-megacycle totalizing electronic counter and a direct-reading r.p.m. tachometer.



No. 30648 LINE TYPE

HUB-RAK

THE PRIMARY RACK FOR SECONDARY SERVICES

Hot Galvanized

There are many good reasons why the Hub-Rak has enjoyed top popularity in the years since its introduction. It has been designed for easy mounting and long-life economy, in a range of sizes for every application. Note these features:

1. Forged steel points rigidly attached through the back to form a single unit . . . points smoothly rounded on all exposed surfaces.
2. Heavy back pressed to channel shape for added strength . . . designed to allow back-to-back mounting on poles.
3. Points perfectly aligned . . . rack bolts easily inserted . . . insulators easily replaced.
4. Mounting slots conveniently located to allow insertion of mounting bolts back of insulators at points of greatest strain, or wherever desired.
5. Line and Service Types with extended backs; Line Type also with non-extended back.
6. Finest grade porcelain insulators, designed for protection to conductor while "pulling in" the lines.
7. A rugged unit of heavy steel . . . the finest rack ever produced.

HUBBARD AND COMPANY

ESTABLISHED 1843

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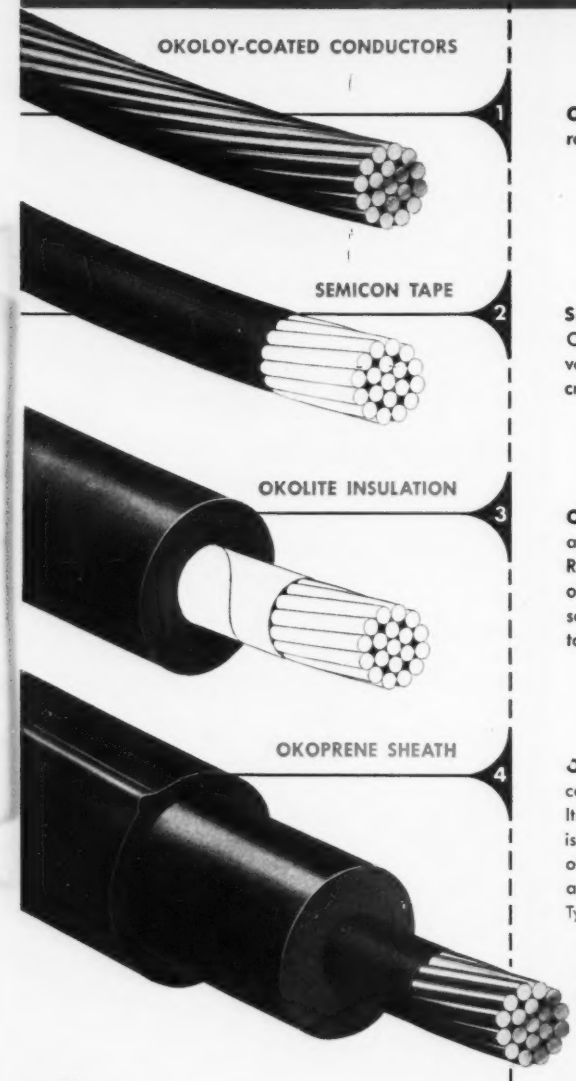
"Hang the Load on Hubbard Hardware!"

4 reasons why OKOLITE-OKOPRENE CABLES EXTEND CIRCUIT LIFE



Okoloy coating on conductors—the special corrosion-resistant lead alloy that outlasts tinning 2 to 1.

Semicon tape over conductors—used in all Okolite-Okoprene cables operating at over 2,000 volts—eliminates internal corona cutting and increases dielectric strength.

Okolite insulation—moisture-resisting, high-voltage Okolite is made with Up-River Fine Para Rubber, the best grade of natural rubber. This oil-base insulation has been proved in years of service and is approved by Underwriters' Laboratories, Inc. as Type RW.

Okoprene sheath—the pioneer neoprene cable covering developed in the Okonite laboratories. Its life-extending durability and stable characteristics have been demonstrated on millions of feet of cable installations. Okolite-Okoprene cable is approved by Underwriters' Laboratories, Inc., as Type RWSN.

Besides these four basic features, Okolite-Okoprene cables possess many other advantages in installation, operation, design and manufacture. For complete information on characteristics and applications, write for Bulletin WE-1037. The Okonite Company, Passaic, N. J.

THE BEST CABLE IS YOUR BEST POLICY

OKONITE SINCE 1878 *insulated wires and cables*

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68 Post Street
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ELECTRICAL WEST

Reader Service

The editors of Electrical West will be glad to answer questions on engineering techniques; in the lighting and wiring fields; on the electrical code; on merchandising and appliance markets and other phases of the electrical industry in the eleven Western states

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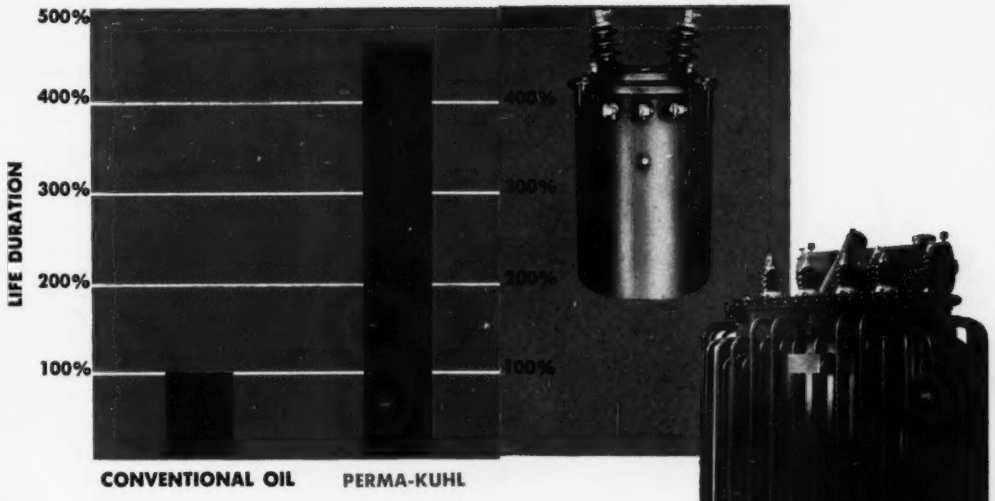


a great new oil

for KUHLMAN transformers perma-kuhl

Lasts 4 times as long . . . increases transformer life!

Perma-Kuhl— the revolutionary new inhibited oil that resists oxidation, reduces sludging and prolongs transformer life is now furnished with all Kuhlman oil-filled transformers at *no extra charge!*

The graph above illustrates how Perma-Kuhl has a service life over four times as long as conventional transformer oil. While conventional oil oxidizes rapidly under present day peak load operating conditions, Perma-Kuhl resists this oxidizing action. Thus it remains fresh and in perfect operating condition long after the point at which ordinary oil would have to be reclaimed.

Perma-Kuhl, by resisting oxidation, retards the formation of the sludge which clogs transformer cooling passages. This assures the quick heat transfer from windings to oil so vital in holding original high short time overload capacity.

Perma-Kuhl also resists the formation of acids which are harmful to transformer insulation. By thus protecting the insulation, Perma-Kuhl protects the transformer itself, adds many extra years of service life.

Ask your Kuhlman representative about this important new feature, or contact the Kuhlman Electric Company, Bay City, Michigan.

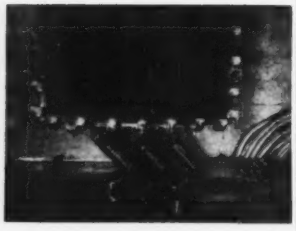
Kuhlman KE

KUHLMAN ELECTRIC COMPANY
BAY CITY, MICHIGAN

Export Representatives: *International Standard Electric Corporation,* 67 Broad Street, New York 4, N. Y., Cable Address, Microphone, N. Y.

Undersea wiring failures stopped with plastic tape!

Proof that plastic tape protects ➡



In the installation shown at right, transition splices between lead and rubber covered cables, subjected to corrosive action of salt water in a manhole below high-tide level, are still in perfect condition. This tough job at San Francisco Naval Shipyard is completely protected by watertight splices made exclusively with "SCOTCH" No. 33 plastic and No. 24 Neoprene Electrical Tape and "3M" Adhesive No. EC-847. Cables have been in service more than 18 months and show no signs of deterioration.

Whatever your insulating problem one of the many "SCOTCH" Brand Electrical Tapes can help you. They are easy to apply. Seal snugly around odd shapes and uneven surfaces. Write Dept. E P 251 for full information.

QUICK FACTS ABOUT "SCOTCH" No. 33 Electrical Tape

- **TOUGH PLASTIC**—is abrasion resistant, unaffected by water, oil, alkalies, alcohols, sunlight.
- **HIGH DIELECTRIC**—10,000 volts.
- **THIN CALIPER**—only .007 inch thick.
- **STRETCHY**—moulds to any surface.
- **NON-CORROSIVE**—contains no sulphur-bearing compounds.
- **P. S.**—for permanent high-heat insulation try "SCOTCH" Electrical Tape No. 27 with glass-cloth backing, thermosetting adhesive.

SCOTCH BRAND Electrical Tape No. 33

The term "SCOTCH" and the plaid design are registered trade marks for the more than 100 adhesive tapes made in U. S. A. by MINNESOTA MINING & MFG. CO., St. Paul 6, Minn., also makers of "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-Slip Surfacing, "3M" Abrasives, "3M" Adhesives. General Export: Durex Abrasives Corp., New Rochelle, N. Y. In Canada: Canadian Durex Abrasives Ltd., Brantford, Ontario.

New Load Centers Have Panelboard Features

(15) Trumbull Electric Mfg. Co., Plainville, Conn.

A new line of load centers comes 40 to 100 amp., 1 through 20 circuits for residential and commercial applications; is claimed to have panelboard features. These include the TQL breaker, said by the manufacturer to be the first plug-in, quick-make, quick-break breaker with thermal-magnetic protection used in a load center.

These load centers are constructed with removable free-floating interiors that are mounted on captive springs to eliminate need for screws or tools and make possible flush mounting except on load centers with 40-amp. mains. Interior design consists of silver-plated copper busbars and stab assembly, into which the plug-in breakers are assembled by means of their pressure-type stabs and an anchor that clamps into the recess on the breaker.

Breakers of all sizes from 15 to 50 amp. are physically interchangeable in the load centers; 12- through 20-circuit load centers permit sequence phasing. Bulletin TEB-12 describes the load centers in detail.

(16) **OVEN**—A portable industrial electric oven, model CR-1 made by Grieve-Hendry Co. Inc., 1101 N. Pauline St., Chicago 22, has a single-phase, 110-volt motor. D-c units are available. Size is 29 in. wide, 24 in. deep, 20½ in. high. According to the manufacturer, it has been found practicable for such uses as baking enamels, lacquer, wrinkles and other finishes; for dehydrating bobbins, coil forms, paper tubing; for drying plastic granules, parts after cleaning; for preheating molds.

(17) **MONITOR**—A low-cost FM communications monitor that requires no adjustment during operation has been announced by Hewlett-Packard Co., 395 Page Mill Road, Palo Alto, Calif. It is available as model 337A, operating on one crystal-controlled frequency, or model 337B, operating on any of four frequencies.

(18) **SEAL**—Termin O Seal, a unit to seal electrical terminals in the presence of gas or fluids, has been announced by Franklin C. Wolfe Co., 407 Commercial Center, Beverly Hills, Calif. It is claimed that entry or escape of fluids and gases is prevented through use of a neoprene sealing gland in temperatures ranging from -67°F to 225°F. Silicone rubber is used where temperature ranges from 100°F to 500°F. Complete with studs and insulators, the unit is available for voltages up to 12,000 and for high frequencies.

(19) **ACCESSORY**—A filter-magnifier claimed to whiten the light from an ordinary incandescent bulb and to almost double its intensity is being manufactured by Fairbridge Co. Inc., 945 Main St., Bridgeport, Conn.

Match LONG POLE LIFE with Long-Lasting Guys made of Copperweld Strand

—It Pays!

Scientific pole treatment has extended the estimated service life of modern poles to about 30 to 50 years. That's going to save money for you. And you can save more if you don't have to replace guys during the life of these poles.

With Copperweld Guy Strand you can match the life of your poles—because Copperweld *cannot* rust. Its original strength is permanent. And because you pay for only one guy installation during the life of the pole, Copperweld is the most economical strand you can use—and the most dependable. Our engineers will be glad to discuss its advantages with you.

Copperweld Strand is Permanently Protected against Corrosion. Each Wire has a thick Copper Covering inseparably Molten-Welded to a strong Alloy Steel Core.

Copperweld Costs Less because it Lasts Longer

COPPERWELD STEEL COMPANY

GLASSPORT, PA.

Pacific Coast Office: Monadnock Bldg., San Francisco

Copperweld TRADE MARK Non-Rusting GUY and MESSENGER Strand

Improved....

Series 63300 B

FISHER-PIERCE

PHOTOELECTRIC CONTROL

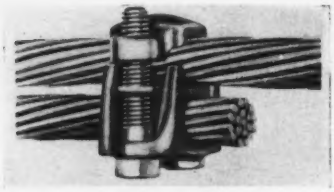
FOR STREET LIGHTING

This new Fisher-Pierce Control is the result of long experience in design and manufacture, combined with practical experience of more than 600 electric utilities in more than 20,000 installations.

The new 63300 B Control is mechanically and electrically interchangeable with existing controls. The same dependable Fisher-Pierce circuit, consistently giving tube life of more than 20,000 hours, has been retained. Improved spacing and insulation provides increased protection against lightning damage . . . up to 2500 volts rms Hipot. Mechanical design has been altered to provide maximum simplicity for greater economy of servicing.

The FISHER-PIERCE Co., Inc.

43 CEYLON STREET, BOSTON 21, MASS.



Bronze Distribution Power Connectors

(20) Anderson Brass Works Inc., P. O. Drawer 2151, Birmingham 1, Ala.

Two series of 2-bolt, 1-piece line clamps, K and KR, compensate or flex as the conductor increases or decreases with the rise and fall of conductor and/or ambient temperatures. The two series differ in one respect—type KR incorporates a spacer bar and type K does not. The former, because of its spacer bar, gives better current distribution among the strands and thereby provides higher conductor utilization and circuit security, particularly when fault currents are severe.

Upper and lower clamping members are cast of a special high-strength copper alloy. The conductor spacer bar is of a high-conductivity copper alloy chosen because of favorable electrical characteristics and resistance to cold flow while under compression. Bolts are of high-grade silicon bronze.

Seven sizes in each series cover the range of connecting a No. 4 or a 1,000-MCM main to a No. 8, or 1,000-MCM tap.

(21) **RADIATOR** — A 3-heat adjustable electric steam portable radiator is available from Sentry Metal Products Inc. It weighs approximately 39 lb.; is 17½ in. high, 9 in. deep, 18¾ in. wide. Details from Smith Benny Sales Co., 11 W. 42nd St., New York 18.

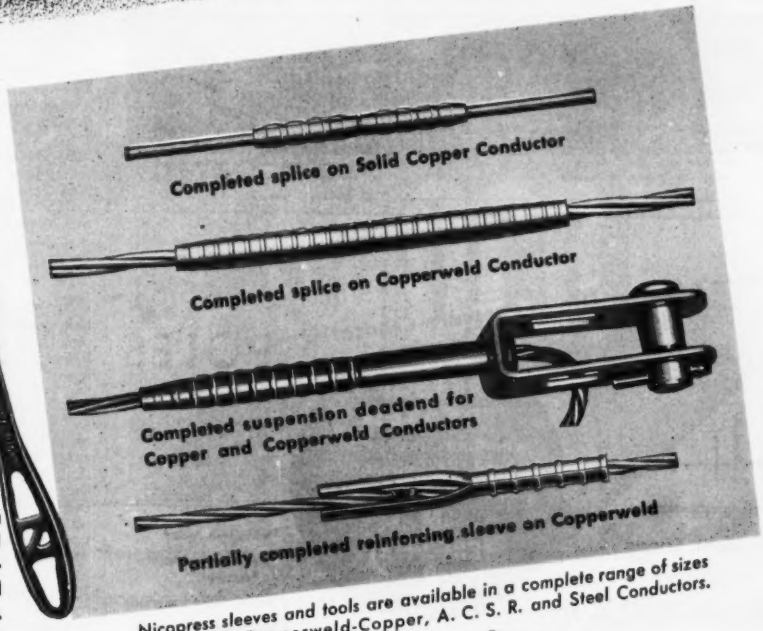
(22) **CONTROL**—A delayed action photoelectric control, set PID, has been designed to indicate the presence of a jam on a conveyor line and to introduce stop motion or other correction. Made by Photoswitch Inc., 77 Broadway, Cambridge 42, Mass.

(23) **HOSPITAL BED** — An electrically operated device that permits one nurse to lift a heavy patient is offered by Invalift Inc., 1245 Rainier Ave., Seattle, Wash. The 250-lb. machine can lift 1,000 lb.

(24) **MOTOR CONTROL**—An improved mechanical remote control for its Speed-Trol variable-speed electric power drives has been announced by Sterling Electric Motors Inc., Los Angeles 22. It is designed for adaptation to any Speed-Trol now in use.

"JOB PROVEN" THE WORLD OVER Nicopress

Illustration of No. 51 type Nicopress tool with P. & J. Grooves.


Completed splice on Solid Copper Conductor
Completed splice on Copperweld Conductor
Completed suspension deadend for Copper and Copperweld Conductors
Partially completed reinforcing sleeve on Copperweld

Nicopress sleeves and tools are available in a complete range of sizes for Copper, Copperweld-Copper, A. C. S. R. and Steel Conductors.

Nicopress

is the Registered Trade Mark of The National Telephone Supply Company

The National Telephone Supply Company

8100 SUPERIOR AVENUE • CLEVELAND 3, OHIO

Canadian Mfr.—H. SLATER CO., LTD., HAMILTON, ONT., CANADA

Export Distributor—INTERNATIONAL STANDARD ELECTRIC CORP., NEW YORK, N. Y.

THE NATIONAL TELEPHONE SUPPLY COMPANY

PARANITE HYDRO-THERM
BUILDING WIRE

● Paranite Hydro-Therm combines in a single wire the heat-resistant qualities of Type RH and the moisture-resistant qualities of Type RW.

USED IN DRY LOCATIONS Paranite Hydro-Therm carries more current per dollar of cost. The higher amperage rating for Type RH wire under the National Electrical Code provides greater current carrying capacity. You can use smaller conductors, smaller sizes of conduit; and lower your labor costs.

USED IN WET LOCATIONS Paranite Hydro-Therm is rated as Type RW wire for 60°C operation because of its excellent moisture-resistant qualities.

IF IT'S **PARANITE** IT'S RIGHT!

DISTRIBUTED THROUGH WHOLESALERS

PARANITE WIRE AND CABLE
Division of ESSEX WIRE CORPORATION
FORT WAYNE 6, INDIANA

PARANITE

ELECTRICAL WIRES AND CABLES *"BETTER THAN CODE REQUIRES"*

WAREHOUSES* AND SALES OFFICES: *Atlanta, Ga.; *Chicago, Ill., Cleveland, Ohio; Dallas, Texas; *Detroit, Mich.; *Kansas City, Missouri; *Los Angeles, Calif.; *Newark, N. J.; Philadelphia, Pa.; *Portland, Oregon; *St. Louis, Missouri; *San Diego, California; *San Francisco, California

There's Longer Life in Pressure-Creosoted

PRESSURE TREATED
with Coal Tar Creosote
for Long Life, Dependable, Economical Service

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CREO-FIR
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POLES
by
McCORMICK & BAXTER

Straight, Strong
Durable
OREGON DOUGLAS FIR
Poles • Piling • Lumber • Ties • Crossarms

- Machine Peeled
- Full-length Pressure Treatment
- Manufactured Uniformity
- Immediate Delivery

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SAN FRANCISCO — 485 California St. • DOuglas 26771
LOS ANGELES — 6214 W. Manchester Ave • ORegon 8-3726

Treating Plants:
PORTLAND, ORE
STOCKTON, CALIF.

(25) CAPACITORS—A new piston-type variable trimmer capacitor claimed to give the minimum capacities needed for exceptionally accurate and stable electronic adjustments is being produced by the JFD Mfg. Co. Inc., 6101 16th Ave., Brooklyn 4, N.Y.

(26) APPLIANCE TESTERS—Heat tests on coffee makers, waffle bakers, toasters, sandwich grilles, flat irons, etc., may be made with pyrometer-type appliance testers being made for manufacturers by Elematic Equipment Corp., 1150 W. Marquette Road, Chicago 21.

(27) VENTILATOR—A bathroom ventilator with a time delay switch is claimed to exhaust all odors, dampness and steam from shower or bath before automatically shutting itself off. The switch can be set for any period up to 30 minutes. Trade-Winds Motorfans Inc., 5725 S. Main St., Los Angeles 37, Calif.

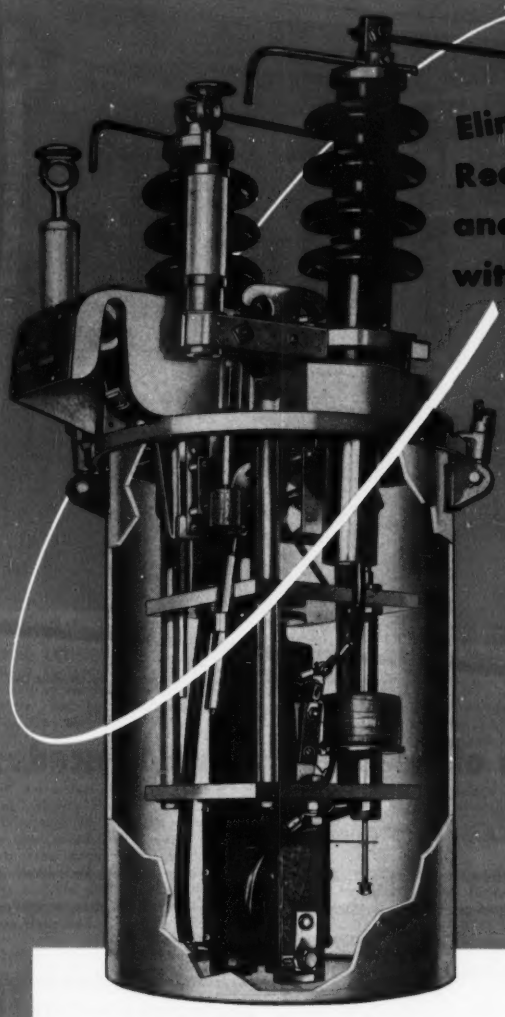
(28) CONTACTOR — An 00 multi-pole convertible contactor, measuring 2¾x2¾ in., is being made by the Arrow-Hart & Hegeman Electric Co., Hartford, Conn. Designated type CRA, it is said to give instant circuit conversion without additional parts, by means of reversible contacts, and to save control panel space, simplify panel mounting and reduce installation and maintenance time. It has four basic parts: frame, containing magnet, coil and patented right-angle mechanism; movable contact unit; stationary contact base; mat-finished contact cover plate.

(29) SIGNAL GENERATOR — A new signal generator for microwave or superhigh frequencies offers continuous coverage of frequencies from 3,800 to 7,600 megacycles. All frequencies are directly read on the central tuning dial. Hewlett-Packard Co., 395 Page Mill Road, Palo Alto, Calif.

(30) WELDING CONTROL — Synchronous and non-synchronous control equipment for low-capacity, spot-type resistance welding machines is offered by Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa. Air-cooled thyratron tubes make and break the welding current with no moving parts. All components in each equipment are mounted on a side-swinging panel, enclosed in a NEMA type 1 enclosure. Units may be mounted on or near the welding machine. Synchronous units can be supplied in r.m.s. current ratings up to 50 amp. at 10% duty cycle. Non-synchronous units are available in ratings up to 100 amp. at 10% duty cycle.

(31) PORTABLE LIGHT—A new light for machine shop, assembly line or home workshop has a permanent magnetic base for attaching with a 50 lb. pull to flat or curved metal surfaces. The base holder is 1x1⅛x1½ in. A 25- or 40-watt bulb may be used. Length with bulb is 4¾ in. Enco Mfg. Co., 4522 W. Fullerton Ave., Chicago 39.

(32) SIGNAL—A new Panalarm, backlighted multiple unit signal is claimed to detect off-normal operation of almost any type equipment. Cabinets may be secured with any number of alarm units, depending upon requirements. Designation plates for each signal are printed or engraved according to customer's specifications. Panalarm Products Co., 7218 N. Clark St., Chicago 26.



Eliminate Special Service Trips
Reduce General Maintenance
and Get Longer Service Life
with the

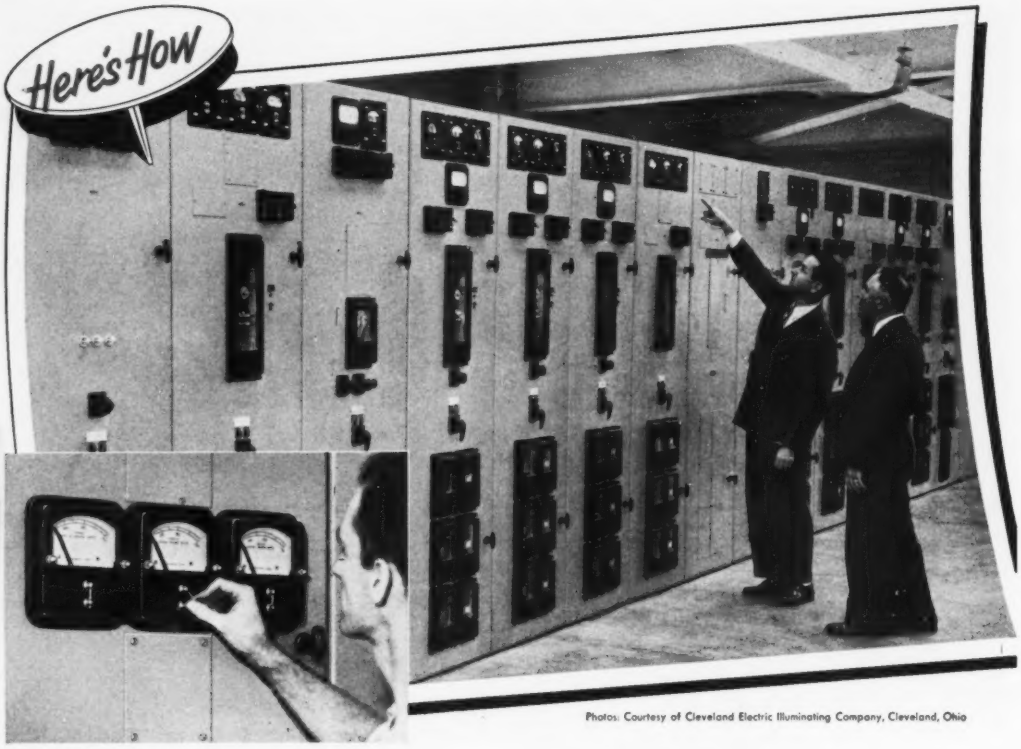
Big
KEARNEY
Automatic
OCR

The larger overall dimensions, the greater oil capacity and the increased internal electrical clearances are your guarantees of greater operating satisfaction. Time current characteristics are available upon request.

JAMES R. KEARNEY CORPORATION
4224-42 Clayton Ave., St. Louis 10, Missouri
Canadian Plant: Guelph, Ontario

West Coast Distributor: MAYDWELL & HARTZELL

BETTER CONSTRUCTION *Safer* MAINTENANCE



Photos: Courtesy of Cleveland Electric Illuminating Company, Cleveland, Ohio

You can solve the problem of keeping loads balanced...

LINCOLN Thermal Ampere Demand Meters

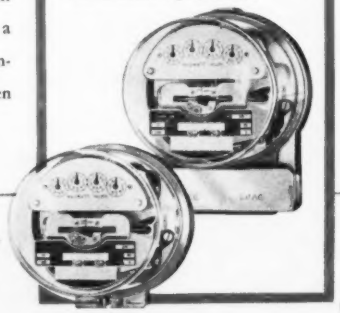
Because of today's constantly changing load requirements, you get the most out of your distribution system only when you keep loads between feeders balanced on the basis of *continuous* ampere demand information.

Permanently installed Lincoln Ampere Demand Meters give you the continuous measured facts. They show the value of current which remains on the feeders long enough to affect the carrying-capacity of the lines and distribution equipment. They're economical, too,—their cost is often paid for in one year by eliminating periodic surveys.

Lincoln Ampere Demand Meters are available for indoor and outdoor substations. When desired these meters can be furnished in types incorporating a self-contained ammeter to show immediately whether the load has been picked up when the feeder switch is closed. For full information, write for Bulletins 461 and 467.

Sangamo J Meters

These watthour meters meet today's requirements and tomorrow's anticipated loads with sustained accuracy, economy of maintenance and troublefree performance.



Only Measured Facts are Known Facts

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

BULLETINS ETC.

(33) SWITCHES—Type TW-0 outdoor group-operated, rotating-insulator, vertical-break air switches in 7.5-, 15- and 23-kv., 400-, 600- and 1,200-amp. ratings are described in catalog sheet 120 from Pacific Electric Mfg. Corp., 5815 3rd St., San Francisco 24. Catalog 123 from the same manufacturer describes types TW-3 and TW-4 outdoor group-operated, rotating-insulator, vertical-break air switches. TW-3 comes 196 and 230 kv., 1,200 amp.; TW-4, 287 kv., 1,200 amp.

(34) MECHANISMS—Manual operating mechanisms for rotating-insulator air switches are covered in catalog 165 from Pacific Electric Mfg. Corp., 5815 3rd St., San Francisco 24.

(35) FITTINGS—A 12-page catalog, No. 1050, describing the manufacturer's line of solderless wire connectors, cable and conduit fittings and wiring devices has been issued by Buchanan Electric Products Corp., 1290 Central Ave., Hillside, N. J. Complete specifications, dimensional data, application instructions and ordering information are included.

(36) WEDGES—Formed Fiber wedges are described in product bulletin No. 441 prepared by Insulation Manufacturers Corp., 565 W. Washington Blvd., Chicago 6.

(37) FIRE EXTINGUISHERS—Technical bulletin No. 9, explaining the effect of dry chemical in putting out fires in electric motors and generators, has been published by Ansul Chemical Co., Marinette, Wis.

(38) MOTORS, GENERATORS—A 19-page booklet, B-4595, describing the new Life-Line type SK d-c motors and generators is offered by Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa. It shows how the new design uses rolled-steel frames, heavy steel brackets, steel angle feet and prelubricated double-sealed ball bearings to give added strength and life without outages. Types, enclosures and mountings for different applications are described.

(39) LINEMAN'S ACCESSORIES—A 1951 catalog of linemen's suits and accessories is offered by W. V. Haynes Co., 100 S. Bay Ave., Boston 18, Mass.

(40) TOOLS—Portable tools are listed and illustrated in a new catalog available from Skilsaw Inc., 5033 Elston Ave., Chicago 30.

(41) CONTROLS—A booklet that tells in non-technical language the operation of automatic controls for heating, ventilating and air conditioning is available from Barber-Colman Co., Rockford, Ill.

(42) LAMPS—A 4-page folder on cold-cathode fluorescent lamps and cold-cathode fluorescent fixtures has been published by Colonial Electric Products Inc., East Paterson, N. J. It is listed as A-5010.

(43) PLASTICS—"A Simplified Guide to Bakelite and Vinylite Plastics and Resins," is the title of a 24-page booklet available from Bakelite Division, Union Carbide and Carbon Corp., 300 Madison Ave., New York 17.

(44) VENTILATION—Propeller Fan Manufacturers' Assn., 2159 Guardian Bldg., Detroit 26, Mich., is offering a residential ventilation guide to architects, builders, dealers and users.

(45) SLIMLINE FIXTURES—A data sheet, C-5010, on its 200-ma. slimline fluorescent fixtures has been prepared by Colonial Electric Products Inc., East Paterson, N. J. The manufacturer makes fixtures for these lamps in five basic designs with a total of 18 structural and dimensional variations.

(46) ELECTRODES—P&H welding electrodes are covered in a 56-page booklet from Harnischfeger Corp., Welding Division, 4400 W. National Ave., Milwaukee 14, Wis. It is listed as bulletin R7-8.

(47) MOTORS—Bulletin 44-200 from Electric Products Co., 1725 Clarkstone Road, Cleveland 12, Ohio, describes the manufacturer's expanded line of low-speed synchronous motors.

(48) IMPREGNATORS—A new line of equipment for impregnation of electrical coils, carbon parts, wood and other materials is described in bulletin B-30 from Struthers Wells Corp., Warren, Pa. This equipment is available in a range of sizes for vacuum and pressure operation and for use by heating with steam, electricity or Dowtherm, or for non-heated operations.

(49) INSTRUMENTS—Data on Speed-Sort low-range limits bridge is given in bulletin 8A from Associated Research Inc., 3758 W. Belmont Ave., Chicago 18.

(50) CONTROLS—Relays and switches for industrial control are described in an 88-page catalog, No. 4071-F, from Automatic Electric Sales Corp., 1033 W. Van Buren St., Chicago 7.

(51) CHECK LIST—RLM Standards Institute, 326 W. Madison St., Chicago 6, has issued a new 4-page bulletin, No. 1050, containing a complete listing of RLM manufacturers and certified lighting equipment made by each.

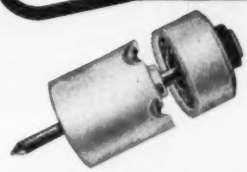
(52) CALCULATOR—A pocket-size, slide-rule-type electrical circuit calculator is described in a folder from Van Halst Calculator, Box 317, Wolcottville, Ind.

(53) TURBINES—Bulletin H-18 from Elliott Co., Jeannette, Pa., covers the manufacturer's turbine generators, 500 kw. and above, for utility and industrial installations.

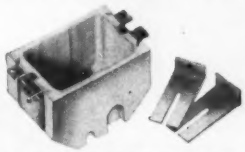
(54) INSTRUMENTS—Bulletin W1821 covering the new line of series 500 strip-chart dynamaster electronic instruments is offered by the Bristol Co., Waterbury 20, Conn. The manufacturer has also published a new edition of its thermocouple and pyrometer accessories, which is available as No. P1238.

To Receive Bulletins
Fill in the Postcards
on Page 55

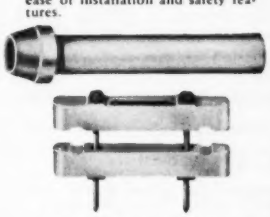
...and for
LOW VOLTAGE TOO!
call
Porcelain Products



Dense, good looking, positive gripping ALLIGATOR Nail Knobs are preferred by electricians insisting on workman-like installations to build good-will and repeat business.



Outlet boxes with Adjustable Metal Mounting lugs and set of Hangers are nationally famous for durability, ease of installation and safety features.



A complete size range of tubes as well as 2 and 3 wire cleats are available for immediate delivery. Made precisely to give long and satisfactory performance.

Both round and oval type split forestry insulators as well as telephone insulators are available for immediate delivery.

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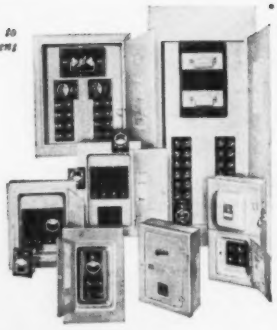
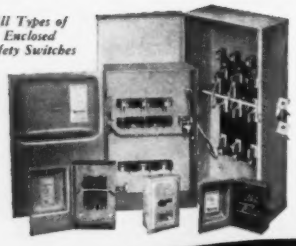


All Types of Enclosed Safety Switches



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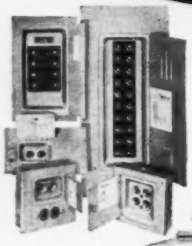
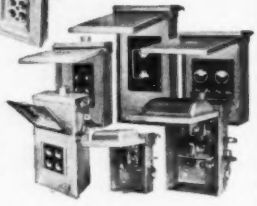


Extensive Line of Branch Circuit and Residence Panels



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ELECTRICAL BOOKS

ELECTRICAL APPLIANCE SERVICING, by William H. Crouse, 854 pages, 6x9, McGraw Hill Book Co., $7.50. This is one of the very few texts on appliance servicing and fills a long-felt need. It is up to date and comprehensive, with description and servicing data on all recent model appliances. It is an invaluable handbook for servicemen, technical students and home owners.

CIRCUIT ANALYSIS OF A-C POWER SYSTEMS, volume II, by Edith Clarke, 396 pages, 6x9, John Wiley & Sons, $8.50. Volume II gives charts and curves for determining skin effect and proximity effect in circuits of non-magnetic solid and tubular conductors. Equivalent circuits for 3-phase transformers and autotransformers are given. Equivalent circuits for parallel transformer banks of unequal turn ratios are given. The book describes the effects of open conductors in 3-phase circuits applying ungrounded transformer banks; and gives charts showing the conditions under which high over-voltage or phase reversal of induction motors, or both, may occur. Methods are supplied for determining the impedances seen from relays during power swings, with and without faults. A method is provided for determining odd harmonics during unsymmetrical short circuits. The book is one of a series written by General Electric authors for the advancement of engineering practice.

STATIC AND DYNAMIC ELECTRICITY, second edition, by William R. Smythe, 616 pages, 6x9, McGraw Hill Book Co., $8.50. A thorough revision of this authoritative work closes the gap that often exists between a thorough grounding in the basic principles of electromagnetic theory and the application of these principles in practical field problems. Changes in the second edition include: use of rationalized mks units; modernized nomenclature; use of the new approved American Standard letter symbols; many new theorems, and simplified generalized derivations; 40 new electrostatic problems, showing how the theory can be extended to unusual boundary conditions; simplification of vector-potential applications to magnetostatics and electromagnetic waves by the use of vector surface harmonics; and 150 new electromagnetic wave problems.

FUNDAMENTALS OF ACOUSTICS, by Lawrence E. Kinsler and Austin R. Frey, 516 pages, 6x9, John Wiley & Sons, $6. Basic facts about the generation, transmission and reception of acoustic waves are presented in clear and concise form. In their selection of topics, the authors' primary aim was to familiarize the reader with the fundamental concepts of terminology of the subject and with the analytical methods for attacking acoustical problems. Seven chapters are concerned with applications of acoustics. Topics included are direct radiator loud speakers, horn-type loud speakers, microphones, psychoacoustics, architectural acoustics, under water acoustics and ultrasonics. Special attention is given to the close association that exists between acoustics and communications engineering. The proposed standards of acoustical terminology of the American Standards Association are used throughout the book.

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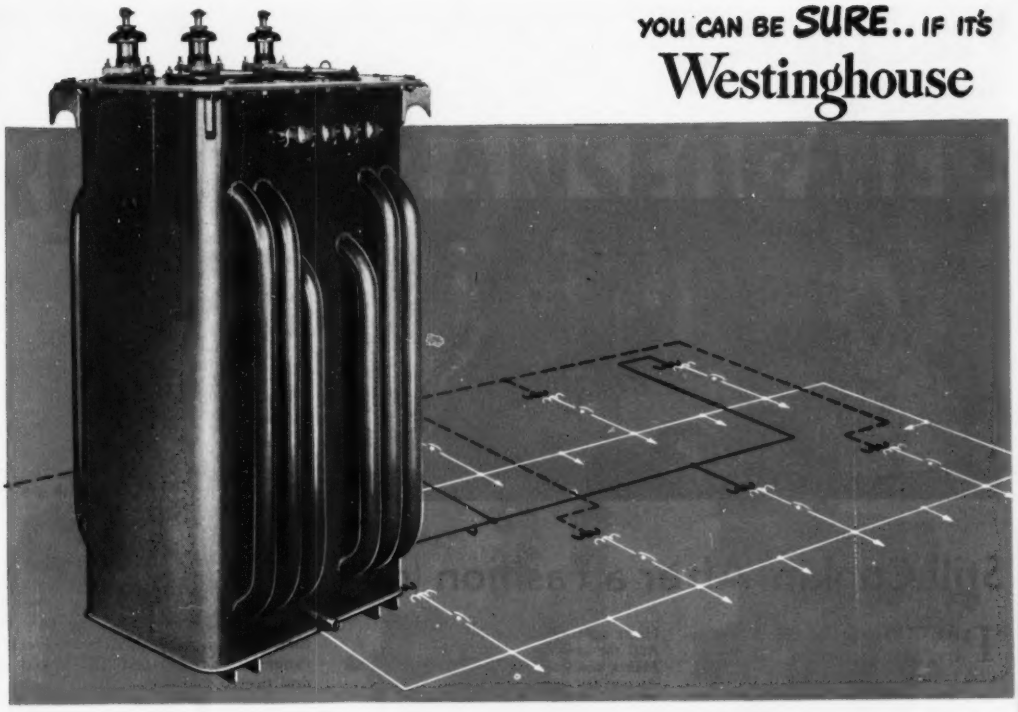
Westinghouse



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to "Borderline" Areas

Where areas of your system make it difficult to justify an underground network, Westinghouse Type "S" Transformers help make economical overhead networks possible. Thus, the advantages of greater service continuity and system flexibility can be extended to heavy-load residential sections, light business districts and similar "borderline" areas.

No matter what type of network system you plan, or what your installation problems may be, Westinghouse can help you keep costs down . . . now . . . and in the future.

HERE'S WHY:

Now—There is a Westinghouse Network Transformer specifically designed to answer each of your network problems. In addition to TYPE "S", there are LIQUID-FILLED (oil or Inerteen®), most economical for general use; "ASL" VENTILATED DRY-TYPES, ideal for indoor service; and SEALED DRY-TYPES, the safest transformers ever built. Standardized construction provides lower initial cost and lower installed cost, too. Special hook-up problems are eliminated.

And in the Future—Years of leadership in the design and construction of network transformers show in the high quality and maintenance-free operation of Westinghouse Transformers. In addition, our complete facilities . . . engineers and calculating boards . . . are available to help you in your network planning, to make future expansion more economical.

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Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver.

ELECTRA'S HUSBAND

Still Cookin' After a Fashion (old)

"PRETTY smart of the gas industry," mused Electra, "to get the radio comedians using a gag line like, 'Now you're cookin' with gas.' Makes it sound as though that was a pretty modern way to cook and there's hardly any answer you electric boys can come back with, is there?"

"No," I agreed, "that was a tough one to crack, but I think it has been done now. Crosley did it at its dealer show in a way that at least no one who attended at any one of the showings will soon forget or fail to use for an answer."

Electra, naturally curious, asked for more details, and here they are.

The four good looking gals of its traveling show troupe came out in one act, dressed in house aprons, their hair disheveled and their appearance, "tired out from a day over a hot stove." And they sang this song:

We are four good gals
With old fashioned ways
'Cause we cook with gas
In these modern days.
Haven't tried as yet
An electric range
'Cause we just plain hate
To make the bloody change.

Chorus

So we keep on cookin' with gas
Yes, we still keep cookin' with gas.
It ain't clean or economic
Doesn't fit this age atomic
But we keep on cookin' with gas.

Oh, the old gas range
Brings many a tear
Heats up the kitchen
And the atmosphere.
Makes you gasp for air
As you fry your gook.
Makes you hate your husband
Every time you cook.

Chorus

But we keep on cookin' with gas
Yes, we still keep cookin' with gas.
We got hot and shiny faces
Hollow in the darndest places
But we keep on cookin' with gas.
Yes! We keep on cookin' with gas.

Oh a kitchen's nice
When it's good and clean
When the white goods glow
With a pretty sheen.
But that old gas flame
Gathers up the dust and
Coats the whole darned kitchen
With an oily crust.

Chorus

But we keep on cookin' with gas
Yes, we still keep cookin' with gas.
Testimony we're now givin'
It's a filthy way of livin'
But we keep on cookin' with gas.
Yes! We keep on cookin' with gas.

When you clean a pot
Or a frying pan
'Til it's shining new
Looking spick and span.
Then you use it once
On the old gas range
And it gets all gritty
Like it has the mange.

Chorus

But we keep on cookin' with gas
Yes, we still keep cookin' with gas.
It's no wonder that we glower
We just cook and scrub and scour
But we keep on cookin' with gas.
Yes! We keep on cookin' with gas.

First I turn it up
And it's too durn hot
Then I turn it down
And the heat is not.
Have to stand and watch
So it will behave
If I just had chains
I'd be a galley slave.

Chorus

But we keep on cookin' with gas
Yes, we still keep on cookin' with gas.
We just stand all day and fight it
Never have a match to light it.
But we keep on cookin' with gas
Yes! We keep on cookin' with gas.

And, to climax the sales presentation that followed, showing the features of the new models of electric ranges, they returned all slicked up and pretty, to sing—

Oh, we ain't gonna cook with gas no more
We ain't gonna cook with gas.
We have seen that brand new Crosley range
So we ain't gonna cook with gas.
No, no, no, no, no, no, no!
No, we ain't gonna cook with gas no more
We ain't gonna cook with gas.
For the Crosley* range we will make
the change
Oh, we ain't gonna cook with gas.

"Aren't you ashamed of yourself, gloating like that," Electra chided. "After all, many of the companies sell both, you know."

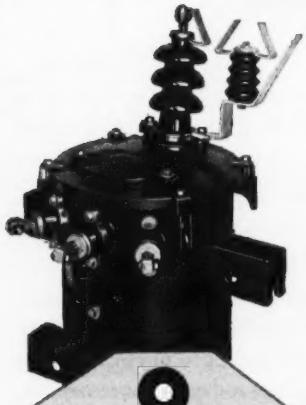
"Not after the way the gas industry keeps throwing the harpoon into electric cooking," I retorted. "You should have seen the script of the skit put on at a gas convention and used to knock commercial electric cooking, and the editorials and blasts from a contemporary gas magazine. And on top of that, say a whisper about gas and the association writes letters to exert subtle pressure through other people to 'dissuade' you. It is high time someone answered back. And that song puts cooking with gas only where it belongs. It's relatively modern."

"How is that?"

"Well it is modern relative to cooking on a wood and coal or oil stove. But when it comes to being really modern, of course it's electric."

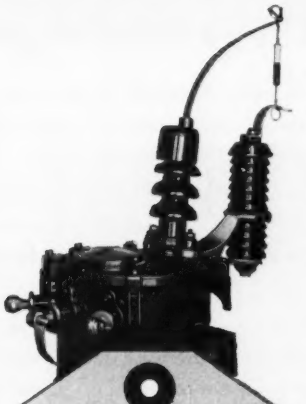
* Surely the manufacturer is deserving of this plug for having cracked the code so neatly.

Write Your Own Ticket for
RURAL TRANSFORMER PROTECTION!



"RU" Transformer with Double Gap and Internal Protective Link

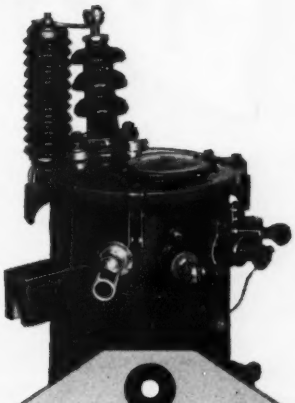
An inexpensive method of protection against lightning and line surges. Type "RU" transformers meet all R.E.A. requirements; are factory adjusted, ready for unit mounting. Bulletin 61B6726.



"RU" Transformer with Arrester-Cutout Combination*

This arrangement gives you lightning protection with expulsion type arrester — overload and fault protection with surge-proof extended range fuse. Packaged, ready to install. Bulletin 61B6726.

*Joslyn Manufacturing and Supply Company



ACP* Transformer Premium Protection

Includes lightning arrester, secondary breaker, internal H. V. protective link . . . gives signal light indication of load conditions . . . permits full utilization of transformer short time overload capacity . . . ready to install. Send for bulletin 61B7309.

**ACP* is an Allis-Chalmers trademark.*

GET AS COMPLETE PROTECTION AS YOU NEED!
. . . PAY ONLY FOR WHAT YOU NEED!

WHEN IT COMES TO PROTECTIVE DEVICES you save two ways when you specify *Allis-Chalmers* distribution transformers.

1) Your choice of 3 basic protective arrangements (above) enables you to meet *specific* applications most economically.

2) Protected transformer is delivered as a packaged unit, factory adjusted, ready to install.

A qualified A-C sales engineer will be glad to give you an unbiased recommendation on the type or types best for your system. Call your nearby A-C sales office, or write for bulletins.

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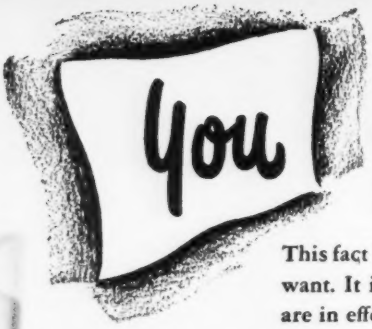
there are *no allocations* on

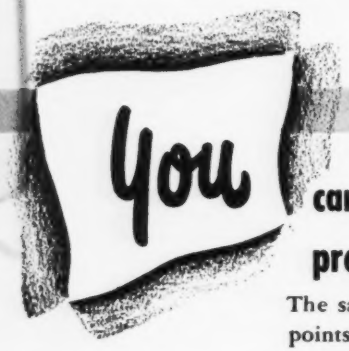


can make new conductor and strand last 3 to 10 times longer . . .

This fact is important enough in times when you can get all the conductor you want. It is doubly important now that allocations of conductor and strand are in effect.

It has been proved time and again, that conductors fail most frequently at support points . . . from vibration, from power arcs, from chafing in the clamps. Even mid-span failures may be caused by vibration and arc-over.

Preformed Armor Rods provide a positive means for reducing these failures to a degree not possible with any other means of conductor protection. They are backed by exhaustive tests in the Country's best equipped physical testing laboratories. They are installed on thousands of lines today. (Laboratory test reports and names of present users are available on request.) They cost far less . . . installed . . . than any other form of conductor protection.



can make splices and repairs at a fraction of your present costs...and save conductor in the bargain

The same tight-gripping action that PLP Armor Rods develop at support points makes them ideal for splices and conductor repairs. Splices made with PLP Armor Rods actually exceed the original conductor in tensile strength and current-carrying capacity.

Preformed Armor Rods are quickly applied. The average installation takes about 3 minutes. No sections of line need be cut out. No high clamping pressures are developed that might damage the underlying conductor. *Any* lineman, regardless of his skill, can make a perfect installation every time. RESULTS ARE PREDICTABLE WITH PLP ARMOR RODS.

armor rods today assure more operating conductor tomorrow

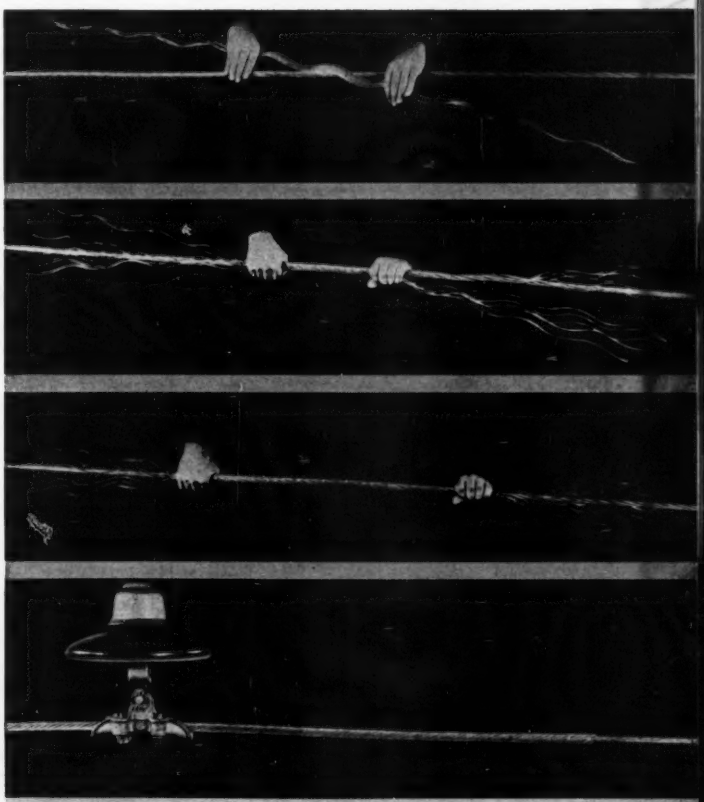
the *conductor you save!*

You can learn the technique of applying PLP Armor Rods in the time it takes to read this

Because PLP Armor Rods are preformed, the only tools you need to apply them are your hands. If you can wring water from a cloth, you have mastered the motion needed. It is as easy as this:—

1. Take half to a full set of rods specified for the conductor you are working on. Place them across the conductor in the same direction as the lay of the conductor.
2. Grip the rods and the conductor in each hand and rotate in opposite directions. Just like wringing water from a cloth.
3. Repeat with the rest of the rods as above.
4. Continue the wiping action with the full set of rods until you have progressed to both ends of the rods. The ends will snap into place. No clips or clamps are needed to secure them.

You could make a perfect installation with what you have just learned. Like to try? We will gladly send you a sample set of PLP Armor Rods to examine thoroughly in your own office. Write on your company letterhead, to:—



PREFORMED

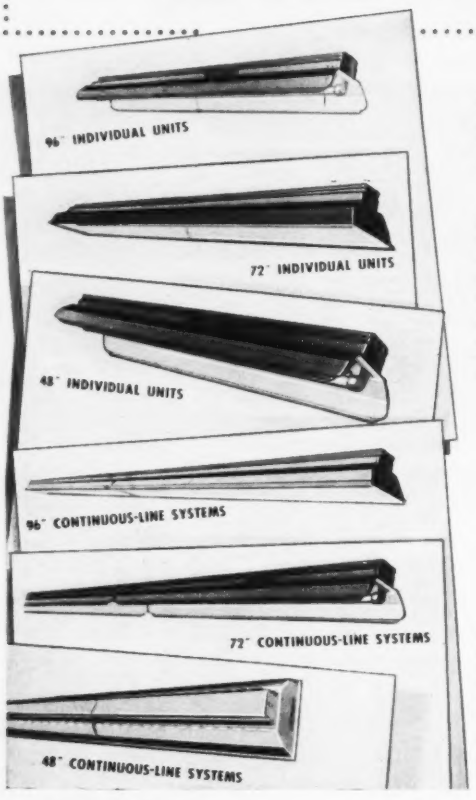
PLP

LINE PRODUCTS CO.

CLEVELAND 3, OHIO

*Preformed Armor Rods are for use under Patent No. 2,275,019 . . . other patents pending.

NEW BENJAMIN "MAGNA-FLO" BULLETIN Available Now!



Tells Why You Capitalize Fully on the EXTRA EFFICIENCY of the NEW T12 SLIMLINE LAMPS when you specify NEW BENJAMIN "MAGNA-FLO" SYSTEMS

Bulletin MF brings you complete data on the 18 different types of Benjamin "Magna-Flo" Units for the 96", 72" and 48" T12 Slimline Lamps. It describes all the "Magna-Flo" advantages which make possible *higher lighting levels* at lower cost with sustained efficiency.

Of special interest are illustrations, descriptions and other data on the many Benjamin "Magna-Flo" features which enable you to capitalize fully on the extra-efficiency of the new, instant-start, single-pin T12 Slimline Lamps. Among the features described are:

- **The right unit for every installation requirement.** Wide variety of types and sizes! Individual units or continuous lines . . . closed or open-end . . . apertures for brightness control.
- **Speedier lamp maintenance with new single-pin "SPRINGLOX" Lampholders!** Lamp pin contacts cannot get out of order . . . faster lamping and re-lamping . . . eliminates danger of lamps dropping out . . . exclusive with Benjamin!
- **High light reflection factor** of Benjamin "Life-Time" Porcelain Enamel Reflectors (82% minimum).

. . . and of course, as you would expect of any Benjamin Fluorescent Lighting Unit, you get Certified Ballasts for minimum service interruptions; easy-to-clean "Life-Time" Porcelain Enamel Reflectors; RLM-approved open-end reflector contour; famous "built-like-a-battleship" construction for greater structural strength and elimination of channel sag; and all the other plus-values which you naturally associate with Benjamin Quality.

Get all the important facts about "Magna-Flo"—the most modern way to get MORE LIGHT at LOWER COST! Mail the coupon below TODAY!

R-5366S

"LOK-LATCH" Reflector Fasteners
Hand-operated. Permit rapid attachment and detachment of reflector from housing.

"SPRINGLOX" Lampholders
Patented construction greatly simplifies and speeds up lamp insertion and removal.

"Magna-Flo" Units are available for either two or three 48", 72" or 96" T12 Slimline Lamps

Benjamin Lighting Equipment Is Sold Exclusively through Electrical Distributors

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Please send me, without cost or obligation, your Bulletin MF to assist me in obtaining MORE LIGHT at LOWER COST.

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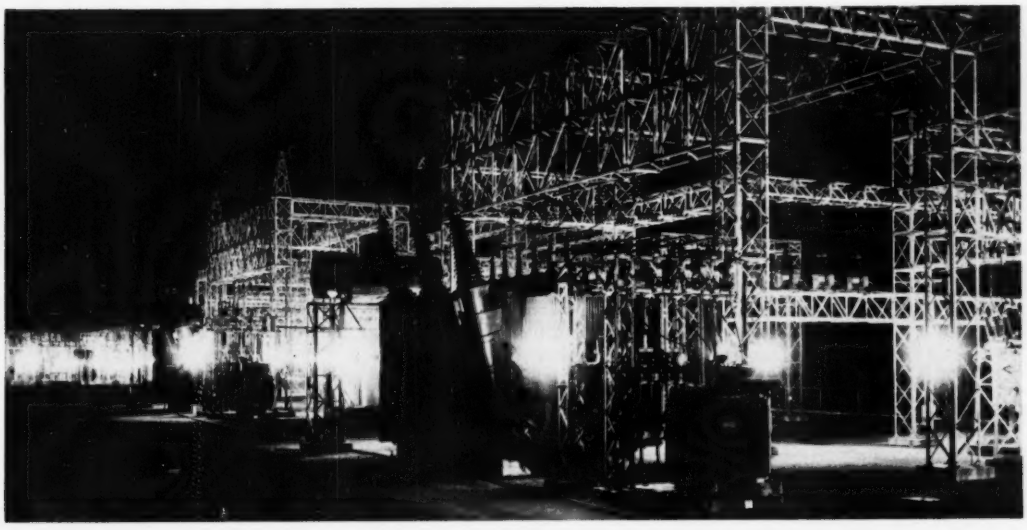
FEBRUARY, 1951 Vol. 106, No. 2

ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED SECTION OF THE U. S.



B. C. Electric Co.

MOBILIZED FOR DEFENSE

THE Far West's economy is the richest, the most diversified and the most dynamic of any region in the U. S. Today, as in 1941, it is being geared for a productive effort whose magnitude cannot be foretold except by time and the emergencies of a possible World War III.

The accelerated pace of Far Western defense mobilization is reflected in every recent figure for the region's electrical gages. Impressive gains have been made in all electrical categories, ranging from generating capacity and output to number of customers and customer purchases. In fact, the progress shown adds further proof to the conviction that this industry can serve both civilian and defense needs in any national emergency. It is far better equipped to do that job today than it was in 1941. It has twice the resources. Reserves are greater. Efficiency has improved. And it has the experience and training from coping with a myriad of problems such as it will face in the near future.

Two quick gages of the present-day electrical capabilities are generating capacity and output. Back in 1941 the installed capacity of the Far West's power plants was 6,849,160 kw. As 1951 begins the figure is 12,284,645 kw.—almost double. In 1941 the power plants produced 26,944,902,000 kwh. for use by the region's factories, farms, homes and commercial establishments. In 1950 the total production was 63,924,628,000 kwh.—more than two and one-half times as much. During the coming year an additional 1,676,300 kw. of new generating capacity will be added to the region's capabilities. But the growth will not stop there; for 1952 the additions will total 1,368,300 kw. Percentagewise almost a quarter of the total new electrical facilities of the U. S. are going into the eleven Western states.

The degree of defense mobilization that this huge reservoir of electrical capacity will be able to serve is almost limitless. There are ample supplies for an all-out World War III. This is true because, as in the last war, normal civilian production would be curtailed to offset any step up in war-created demands.

Behind the increasing national reliance on this region as a major contributor to defense mobilization is a sustained and substantial record of expansion and growth. The area's population continues to expand. The 1950 Census confirmed the fact that the Far West has been growing faster than any other region of the U. S. The population of the eleven Pacific Basin states was up 44.6% as compared to a national figure of 14%. The industrial development is equally spectacular. Back in 1933 private expenditures in this region for new plant and equipment were $213,000,000. In '49 they were $2,350,000,000, more than ten times as much. It is estimated that during the next decade 10% of the total industrial construction in the U. S. will be in the West.

The detail on what the electrical industry in this region did in 1950 to meet its responsibilities and what it plans to do in 1951 is timely and informative. Virtually all of the following pages of this issue set it forth utility by utility and state by state. We commend the record to every member of the industry because it will give him renewed faith in the industry's capabilities and its potentials.

Table I—Comparison of National to Western Operations for 1949 and 1950

	11 Western States		United States		Per cent West to U.S.	
	1949	1950	1949	1950	1949	1950
Energy generated (thousands of kwh.)	57,926,708	63,924,628	291,099,543	325,730,180	19.9	19.7
Energy generated in hydro plants (thousands of kwh.)	43,421,539	48,893,551	89,748,246	94,498,520	48.4	51.7
Energy generated in fuel plants (thousands of kwh.)	14,505,169	15,031,077	201,351,297	231,231,660	7.2	6.5
Percentage of hydro to total generated	75.0	76.6	30.8	29.0	...	...
Installed generator capacity (kw.)	11,279,482	12,284,645	63,100,334	67,509,268	17.9	18.2
Installed hydro generator capacity (kw.)	7,573,485	8,187,502	16,654,171	17,562,530	45.5	46.6
Installed fuel generator capacity (kw.)	3,705,997	4,097,140	46,446,163	49,946,738	8.0	8.2
Revenue from energy sales (thousands of dollars)	631,106,700	695,000,000	4,614,068,800	5,040,000,000	13.7	13.8

Source: Federal Power Commission. 1950 Estimated on eleven months' operations.

Table II—Ten-Year Generation Record for Western Public Utilities

	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950*
Arizona	1,459,689	2,630,936	3,198,771	3,770,667	3,435,988	2,823,650	2,769,495	3,282,118	3,434,179	3,557,721
California	10,383,352	11,383,154	14,776,371	15,887,456	15,943,740	17,313,659	19,441,429	20,286,893	22,112,191	22,919,163
Colorado	818,213	977,690	1,097,260	1,136,831	1,128,655	1,168,151	1,375,653	1,592,067	1,630,959	1,822,264
Idaho	1,142,341	1,244,946	1,338,183	1,233,764	1,263,032	1,334,914	1,507,474	1,622,107	1,840,226	2,484,599
Montana	2,177,423	2,248,133	2,597,086	2,459,781	2,318,130	2,465,805	2,764,383	2,869,825	2,915,361	3,150,940
Nevada	2,403,747	2,432,124	3,228,132	3,244,462	2,590,404	2,488,076	2,908,189	3,607,239	3,591,363	3,325,068
New Mexico	368,499	409,854	470,931	511,165	556,892	604,992	753,897	845,696	910,885	995,677
Oregon	2,909,772	3,651,159	4,619,280	4,785,539	4,183,748	4,148,566	5,456,577	5,433,228	5,291,441	5,525,072
Utah	564,812	604,393	619,280	436,943	416,956	457,169	562,198	600,208	614,598	643,123
Washington	4,499,031	6,494,920	8,926,679	10,311,897	9,689,862	9,038,842	11,230,994	13,881,239	15,079,298	17,115,330
Wyoming	217,343	243,697	290,538	255,575	263,403	315,898	325,684	388,656	506,207	593,021

FPC reports. *12 months ending November.

Table III—Number of Utility Customers at End of 1950

Class of Customer	11 Western States		United States	
	1949	1950	1949	1950
Residential and rural	5,202,456	5,473,500	37,179,781	39,229,800
Small light and power	806,669	875,500	5,290,768	5,496,000
Large light and power	54,907	58,200	232,125	238,800
Other	24,028	26,200	148,107	158,000
Total	6,088,060	6,433,400	42,850,781	45,122,600

Table IV—Type and Capacity of Generators, November 1950

State	Utilities	Plants	Total Capacity Kw.	Generator Capacity in Kw. of Plants: Water Power No.	Water Power Capacity	Steam Power No.	Steam Power Capacity	Operated by Int. Comb. Engines No.	Int. Comb. Engines Capacity
Arizona	19	53	832,268	14	540,540	11	228,950	28	62,778
California	20	163	5,192,017	122	2,593,707	28	2,553,169	13	45,141
Colorado	45	88	406,222	29	87,660	23	289,648	36	28,914
Idaho	14	50	430,599	41	425,615	1	400	8	4,584
Montana	14	32	442,071	19	425,938	4	11,968	9	4,165
Nevada	8	17	595,672	10	586,275	...	...	7	9,397
New Mexico	22	42	280,728	4	24,910	13	222,392	25	33,426
Oregon	19	74	973,003	52	765,679	13	199,110	9	8,214
Utah	27	80	227,628	60	94,145	4	112,750	16	20,733
Washington	20	53	2,765,298	38	2,564,036	9	197,820	6	3,442
Wyoming	26	53	139,139	17	78,997	11	50,820	25	9,322
11 Western States	234	705	12,284,645	406	8,187,502	117	3,867,027	182	230,113
United States	1,584	3,883	67,509,268	1,460	17,562,530	1,054	48,068,458	1,369	1,878,280

Table V—Number of Customers, January 1, 1950

State	Total	Residential	Rural (Distinct Rural Rates)	Commercial and Industrial Small	Commercial and Industrial Large	Street and Highway Lighting	Other Public Authorities	Railway	Inter-departmental
Arizona	196,285	168,674	941	26,090	217	88	263	...	12
California	3,470,066	2,510,571	418,841	491,423	33,435	3,146	12,143	9	498
Colorado	380,833	299,429	23,881	47,758	8,402	268	1,133	...	12
Idaho	188,701	155,572	7,438	24,728	680	240	43	...	...
Montana	173,076	148,594	...	21,449	2,537	301	88	2	105
Nevada	46,677	37,213	1,000	8,259	87	43	75	...	...
New Mexico	149,489	124,542	4,497	19,318	612	89	431	...	...
Oregon	482,932	404,462	10,779	61,698	3,360	411	2,039	9	498
Utah	193,415	174,107	57	17,242	1,346	376	285	2	...
Washington	730,805	623,898	22,414	79,898	2,821	469	1,272	27	6
Wyoming	75,731	64,454	912	8,806	1,410	61	88	...	...
11 Western States	6,088,060	4,711,696	490,760	806,669	54,907	5,492	17,860	41	635
United States	42,850,781	35,375,366	1,804,415	5,290,768	232,125	31,599	115,530	147	831

Table VI—Farm Electrification by States

State	No. of Farms Jan. 1, 1945	Number of Farms and % on Power Lines: Dec. 31, 1946 No.	%	Dec. 31, 1947 No.	%	Dec. 31, 1948 No.	%	Dec. 31, 1949 No.	%
Arizona	13,142	10,900	82.9*	11,200	85.2*	10,800	82.2*	11,300	86.0*
California	138,917	120,500	86.7	127,800	92.0	132,400	95.3	136,800	98.5
Colorado	47,618	29,700	62.4	32,900	69.1	38,400	80.6	43,700	91.8
Idaho	41,498	35,400	85.3	38,100	91.8	40,600	97.8	41,900	101.0*
Montana	37,747	14,100	37.4	17,100	45.3	21,500	57.0	25,900	68.6
Nevada	3,429	1,700	49.6	1,900	55.4	2,000	58.3	2,100	61.2
New Mexico	29,695	10,400	35.0	12,800	43.1	15,000	50.5	18,900	63.6
Oregon	63,125	56,600	90.0	59,600	94.4	63,300	100.3*	68,000	107.7*
Utah	26,322	20,400	77.5	21,100	80.2	21,600	82.1	21,900	83.2
Washington	79,887	76,000	95.1	76,800	96.1	80,000	100.1*	82,000	103.9*
Wyoming	13,076	6,300	48.2	7,200	55.1	8,200	62.7	10,300	78.8
11 Western States	494,456	382,000	72.3	406,500	82.2	433,800	89.5*	463,800	93.8*
United States	5,859,169	3,335,700	56.9	3,817,100	65.1	4,388,200	74.9	4,994,700	85.2

Data from EEI. *Percentage based upon Farms enumerated by Census of Agriculture, Jan. 1, 1945. 1950 Farm Census is expected to show changes in total number of farms.

1950 RECORD 1951 OUTLOOK

Production Electric energy use in the Far West is two and one-half times what it was ten years ago. In 1950 Western power plants turned out 63,924,628,000 kwh., a gain of 10.3% over 1949. This was 19.7% of all of the electric energy generated in the U. S. and the total for the year included more than half of the nation's electricity produced from water power. Only 23.6% of the power produced in the West comes from fuel plants. Even so, the ratio is growing.

Capacity Power plants in the eleven Far Western states now have a total installed capacity of 12,284,645 kw. During 1950, 1,206,450 kw. of new generators went into operation. Of the total, 392,000 kw. was steam driven, the balance hydro. For 1951 the construction programs of the Western utilities will add 1,676,300 kw.—an all-time record total for any one year. This will represent almost a quarter of the new capacity for the whole U. S.

Expenditures During 1950 Western utilities spent $362,519,000 for new facilities. Federal agencies — USBR, Army Engineers and BPA expenditures totaled an additional $183,686,000. On top of this utilities spent $52,126,000 for maintenance. Of the construction funds 44.5% went for new generating facilities, 12.1% for transmission and the balance for distribution and general plant.

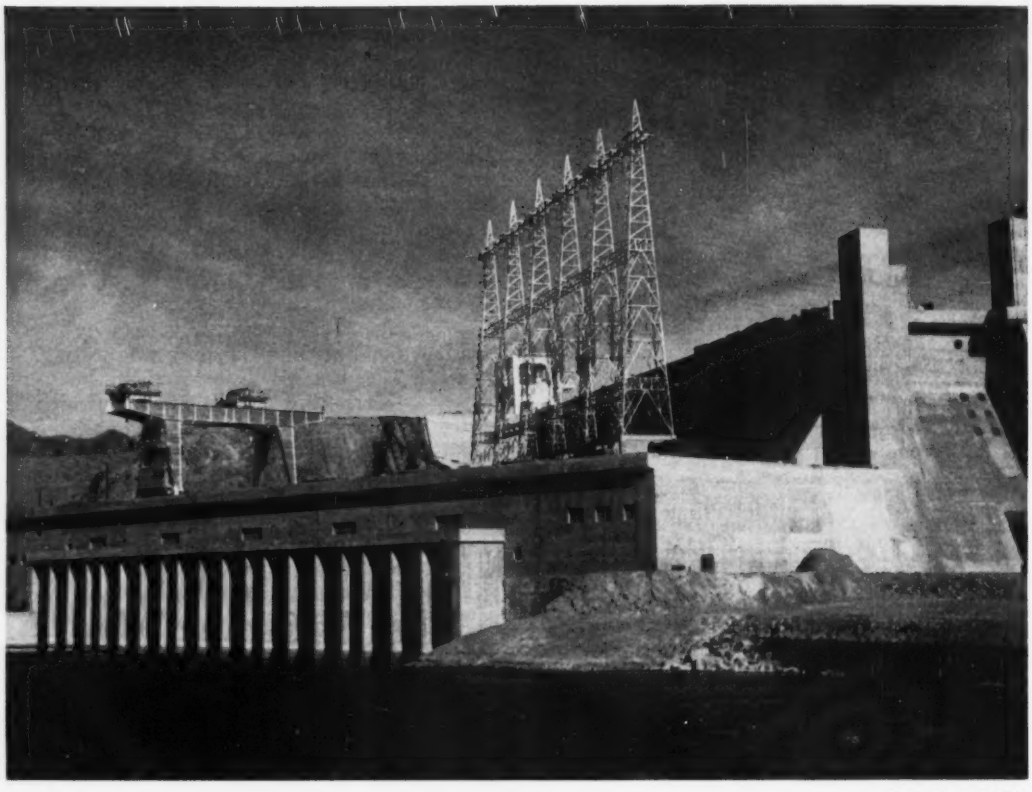
Budgets Funds budgeted for 1951 will total $410,000,000 in the case of the utility organizations. This is a 13% increase over the preceding year. Federal agencies will spend in addition $265,057,000—largely for hydro plants and transmission. Distribution facilities will take a little larger chunk of the budget than last year. Maintenance will add $53,201,000 to the totals.

Customers Customers served by Western utilities now total 6,433,400. During 1950 some 345,340 new customers were added to the lines for a gain of 5.7%. Most of the new customers were in the residential and rural classifications, which now total 5,473,500. Small light and power customers totaled 875,500 at year end, while the figure for the large light and power classification was 58,200. In 1950 these customers paid $695,000,000 for the electricity they used. The degree to which Westerners enjoy lower rates is attested by the fact that the 14.3% of the nation's customers in this area contribute only 13.8% of the utility revenues for the 19.7% of the nation's power that they consume.

Construction Mobilization may slow down but it will not stop the Far West's construction boom. Engineering awards for the eleven Western states totaled $2,318,400,000 for 1950. There is a $10.5 billion backlog of this class of work on the books for the near future. In building construction California was typical. Permits totaled $1,557,586,894. This amount exceeded the previous 1948 all-time record by 26.4%. The 1950 figures were 45.5% ahead of 1949. Present estimates are that 1951 totals will run ahead of 1949 and may even approach 1950 because of the large number of defense plant construction plants planned. That housing will get preference in defense areas seems assured. A recent survey showed, for example, that in San Diego there is a critical shortage of 20,000 individual family dwelling units.

Appliances Whatever the manufacturers of electric appliances allocate from their production to the West in 1951 will be sold. that much is certain, for not only is it the best replacement market but already new population is moving into the West's defense production areas at a rate that is taxing housing. With this new population comes the need for refrigerators, ranges, laundry equipment. If a large number of women take production jobs, the electric appliance becomes a major necessity. High kilowatt-hour per domestic customer averages already bespeak the use that is made of low-cost electricity.

Promotion Until the supply of appliances and wiring supplies dries up, an unlikely prospect at worst, all of the utilities in the West plan to continue telling the public through advertising and promotions the benefits of electric service and the need for adequate wiring to be able to utilize such service.



Davis Dam, USBR

POWER CONSTRUCTION TEMPO IS

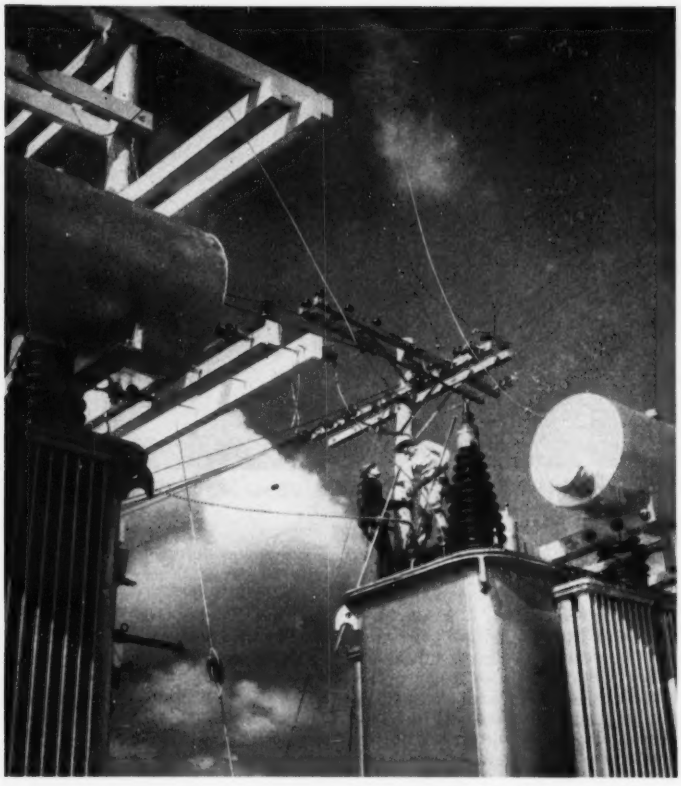
New generation of 1,676,300 kw. is scheduled for new construction in 1951—up 13% over '50.

With utilities of the West again facing large defense power demands, the electrical industry in the eleven Western states has budgeted $410 million for new construction in 1951. This is an increase of $47,500, or 13%, over the $362,519,000 expended in 1950. These figures are exclusive of the federal agencies. The U. S. Bureau of Reclamation, Army Engineers and the Bonneville Power Administration also have stepped up construction budgets. For fiscal 1950-51 these three agencies had appropriations totaling $265,057,000. This compares with $183,686,000 for fiscal 1949-50. Appropriation requests for 1951-52 are not yet known, but it is certain that the federal power program will be accelerated greatly.

New Generation brought in by all agencies during 1950 was 1,206,450 kw. By comparison, 1,676,300 kw. of new generating capacity is scheduled for 1951. For 1952, 1,368,300 kw. is already planned. These and other very interesting figures will be found in ELECTRICAL WEST's exclusive Calendar of New Generation found on page 102. The only thing that could slow up power plant construction is governmental restrictions. Rather than curtailment, the likelihood is that construction schedules will be stepped up in view of the vitalness of electric power to the mobilization program.

Combined Peak of Western power systems for 1950 was 11,192,000 kw., an increase of 8.5% over the 1949 peak.

Power Reserves in some sections of the West are still inadequate despite the fact that generating capacity was approximately doubled between 1946 and 1950 with the addition of 5 million kw. The Pacific Northwest, the area served by the Northwest Power Pool, has no reserves at all. In fact, power use had to be curtailed a year ago. Only bounteous water conditions in the Northwest have prevented shortages this year. California and the Pacific Southwest are in much better shape because of the wise expansion



Mountain States Power Co.

STEPPED UP FOR 1951

Utilities budget $410 million
Peak increases 8.5% in 1950

programs of the several large private utilities. In this area the reserve is estimated to be somewhere between 10% and 15%. The federal government now proposes to tap these reserves by building a 230-kv. transmission line between Klamath Falls, Ore., and Shasta Dam in California.

New Transmission lines built during 1950 aggregated 2,306 miles. For 1951, 2,461 miles are planned.

Distribution Line Mileage in 1950 was 7,783. For this year, 7,121 miles are planned.

Substation Capacity will take a tremendous jump from 2,819,000 kva. added last year to 3,815,500 kva. scheduled for 1951.

Distribution Transformer Capacity added will be about the same this year as last—1,522,820 kva. for 1950; 1,499,000 kva. for 1951.

In the pages that follow will be found statements by utility executives reviewing major construction performed during the past year and that planned for 1951. These individual reports are meaty and well worth reading. Since the report for Pacific Power & Light Co. was written that company has applied to FPC for a permit to build the Yale plant on the Lewis River. Also, Portland General Electric Co. is understood to be reapplying for an FPC permit for the Pelton plant on the Deschutes.

Federal

Army Engineers

Projects of the U. S. Army Engineers will be found listed under the states in which they are located.

Bonneville

Report of the Bonneville Power Administration is on page 94.

REA

Possibly the most serious problem that faced rural electrification leaders in the eleven Western states in 1950 was getting an adequate wholesale power supply, and that problem seemed likely to continue through 1951 as well. But despite this handicap, REA-financed systems in these states bit big chunks out of the remaining unelectrified rural areas during 1950. In the first eleven months of that year, the 152 borrowers energized 10,000 miles of new line, bringing rural electric power to 24,000 additional rural consumers. This job was accomplished in the face of the increasing scarcity of construction materials such as copper and aluminum, and the problem of extending lines into thinner and thinner territory.

REA's loan approvals to borrowers in the West during the year reached a new high, totaling nearly $42 million, an amount nearly $7 million higher than the year before. During the 12-month period ending July 1, 1950, the number of unelectrified farms in the 11-state area was cut approximately in half—from 77,288 down to 39,313. The darkening war clouds once again remind the borrowers of their responsibilities in harnessing rural power to help produce needed foods, a situation ominously similar to the one that confronted them less than a decade ago.

Detailed information on number of borrowers, miles of line and other data will be found in tables on pages 80 and 81.

Bureau of Reclamation

Reports on status of Western USBR projects will be found listed under the states in which they are located. A table will be found on page 83 showing current and future bureau power projects. The comprehensive transmission line construction program of USBR will be found on page 82. The year 1951 will be one of great activity for USBR.

Central Arizona L&P completes 66-mw. unit in steam plant (left). At right: OCB's San Bernardino sub, Calif. Electric Power Co.

Arizona

Central Arizona L&P

Major construction item for 1950 was completing the installation of a 60/66-mw. generating unit at the company's plant approximately 5 miles west of Phoenix. Installation of this last unit completed a program of new generating facilities started more than three years ago bringing the plant's capability up to 155 mw., at a total expenditure of approximately $13 million. These new plant facilities were an extension of the existing plant, which at the end of World War II had a capability of approximately 42 mw.

The accompanying photograph is an aerial view of the rear of the plant and clearly shows the outdoor boiler facilities, which have been typical of Arizona practice for power house installations of such facilities. The original plant cooling water facilities were by means of spray pond installations, but at the beginning of the new construction program a very careful study was made on cooling water facilities and the conclusion reached that cooling towers would be used for the major extension for considerable less expenditure for these facilities, as well as conservation of water. Water supply comes from a series of deep wells on the 160-acre plant site. The new wells that have been brought in to increase the water supply are approximately 2,000 ft. deep. The water needs very little treatment before being used for condensing purposes.

The company acquired a steam generating plant of approximately 7 mw., consisting of three small units, from the Southwest Lumber Mills Inc. near McNary, Ariz. This plant was connected to the northeastern part of the system by means of a 69-kv. transmission line, the lumber mill becoming a customer of the company and the existing generation being used on the general system.

Total expenditure for all electrical facilities on the system, including the completion of the generating unit installation, amounted to approximately $6 million for the year 1950. Approximately $3 million were spent for the extension of lines, both transmission and distribution, substations and transformer capacity to meet the increased demand for electric service in the company's service area.

The system peak load for 1950 was 146,000 kw., which is approximately 10% over the 1949 peak load. Kilowatt-hour sales increased approximately 50 million over the previous 12 months, representing an increase of about 9%.

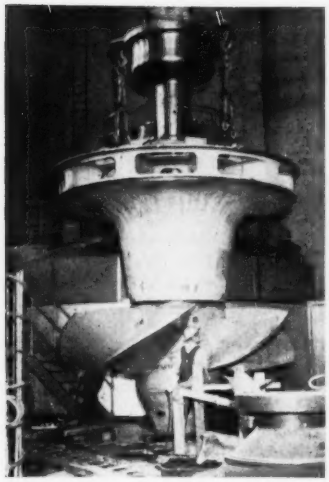
1951 Plans

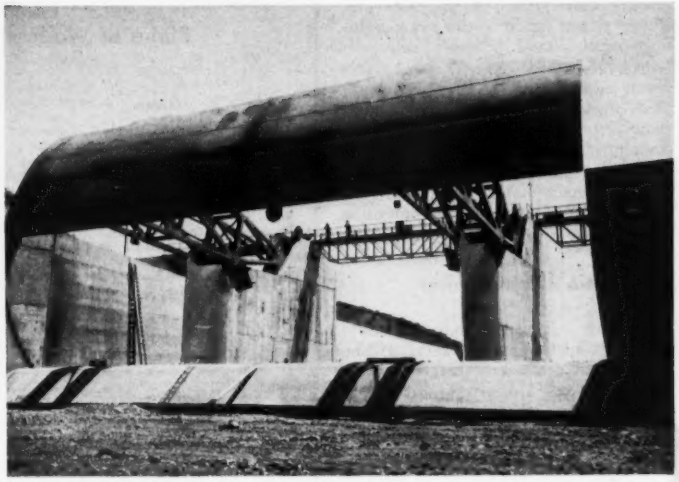
For 1951 there are no scheduled additions of generating capacity and construction expenditures scheduled are estimated at approximately $2 million. Some of the major items of this amount will be $300,000 for transmission facilities, $1,400,000 for distribution lines, services, transformers, meters and substation capacity. During the last several years, the generating, transmission and distribution systems have been greatly reinforced. Thus there is no necessity for any major expenditures during the 1951 budget year. The company feels confident that, with the installation of facilities made in the past several years, and the items planned for 1951, it will be able to meet all requirements for the pending emergency necessitating an all-out effort for war production. — *Geo. H. Groh, vice-president in charge of operations.*

Davis Dam Project, USBR

The Davis power plant will be generating to its full installed capacity of 225,000 kw. next summer when all five of its units will be in operation. The first 45,000-kw. unit is expected to go on the line in January, and the other four units of the same capacity are planned to follow at the rate of about one a month. At full capacity, Davis power plant will be the fourth largest hydroelectric power installation currently in operation by the Bureau of Reclamation. The inauguration of power production at Davis Dam will be in time to be of material aid to irrigation farmers in the Southwest, particularly in the Salt and Gila River valleys of Arizona, southeast of the project.

The Tucson-Cochise 115-kv. transmission line was completed in October. Construction of foundations and erection of the steel towers for the Davis-Hoover-Prescott-Phoenix line were completed in November. Stringing of the Davis Dam-Parker Dam line was completed in October and stringing of conductors and overhead ground wires from Davis Dam to





Turbine runner (left) Drop 4 plant, Imperial Irrigation District. Right: radial gates, Horseshoe Dam, Salt River Power project

Hoover Dam is virtually completed. The Davis Dam-Coolidge line was completed in October. Installation of overhead ground wires of the 115-kv. Phoenix-Tucson No. 1 line began in November.

Completed in April was the 34,500-volt substation at Yuma, Ariz. Construction of the 15,000-kva. substation at Blythe, Calif., is nearing completion, and structural work on the Coolidge and Mesa substations is essentially completed. Specifications are expected to be issued in the near future for construction of the 10,000-kva. Maricopa substation.

Salt River Power Dist.

Installation of the world's largest radial gates, automatically controlling spillway discharge at the Horseshoe Dam, located on the Verde River about 50 miles northeast of Phoenix, was completed in June 1950. Frequency change-over in the Salt River Valley was about 97% complete, customerwise at the close of 1950. Final completion of change-over in the valley is scheduled for March 1, 1951. The remaining 25-cycle load will consist of mining operations in Gila and Pinal counties, and some irrigation pumping around Maricopa, in Pinal County.

A new 30,000-kw. steam plant is scheduled for completion in the first half of 1952. It will be a single-unit, outdoor-type plant with weather siding and decking, and will be located southeasterly from the present Cross Cut steam plant. The Bechtel Corp. will design and construct the plant.—*T. M. Morong, chief engineer.*

Tucson GEL & P

During the year 1950, $1,350,000 were spent for new and improved facilities. The 1951 budget is $1,500,000. System peak for 1950 was 50,600 kw. as compared with 43,000 kw. for 1949, an increase of 17.6%. Major construction in 1950 included adding 22 miles of transmission; 73 miles of distribution; 4,980 kva. of substation capacity, and 12,427 kva. in distribution capacity. Corresponding figures for 1951 are: 24 miles of transmission; 80 miles of distribution; 73,750 kva. in substation capacity, and 13,500 kva. in distribution. Tucson and that section of Arizona continue the rapid growth of the past few years with no let up in sight.

California

Burbank PS Department

Capital expenditure for 1950 totaled $884,000, with nearly twice this amount budgeted for 1951. Major project now under way is a 30,000-kw. addition to the department's steam plant. Total installed cost of the new unit is estimated at $3,750,000, with $2,500,000 to be provided from the sale of general obligation bonds passed in the municipal election of June 6, 1950. The cost difference of $1,250,000 will come from revenues earned by the department during the two-year construction period. This will be the fourth generating unit on the system, and is scheduled for completion during the summer of 1952. The new addition will be a single-boiler, standardized unit of semioutdoor construction. Contracts have already been let for the furnishing of the turbogenerator unit, condenser, condenser auxiliaries, circulating pumps, and cooling tower. Pressure and temperature will be 850 psig. and 900° F, as in the 20,000-kw. unit 3 placed into operation in November 1949. The other two units in the system are each 10,000 kw., 625 psig., 825° F, and were installed in 1941 and 1943.

Scheduled for completion in March 1951 is a new distributing station with an installed transformer capacity of 20,000 kva. This station is urgently needed to provide new distribution feeder capacity, although a similar station was placed in operation in May 1948. The new station is designed for operation by supervisory control. Two other distributing stations and three large industrial substations will also be placed under the supervisory control system, which was contracted for last November.

A net increase of 1,120 domestic consumers and 304 commercial and industrial consumers brought the end-of-the-year totals to 24,672 and 3,778 respectively. Extensions to the secondary distribution system this year amounted to 13,160 ft. Another 30,000 ft. of pole line were installed as a part of the program now under way for rebuilding certain obsolete portions of the distribution system. A net addition of 154 distribution transformers having an aggregate capacity of 2,963 kva. was made. This brings the total transformer capacity on the

distribution system to 52,004 kva. Progress was made in the street lighting improvement program this year when more than 100 new street lights were added, and orders placed for 254 steel pole standards and luminaires to be equipped with 400-watt mercury vapor lamps. Increase in lamp size was made at 28 locations, and 42 ornamental standards were rebuilt for higher lamp mounting height.

California Electric Power

During 1950 approximately $6,100,000 were spent for new facilities. The budget for 1951 is $5,800,000. Construction work authorized and undertaken during 1950 included the following items of special mention: Design work is under way and equipment is being ordered for a 60,000-kw. fuel-electric generating plant scheduled for completion during 1952. Transmission construction included expansion of the system of supervisory control of principal main-line substations, repoling, reconstruction and strengthening of selected lines, and extension of patrol roads.

Distribution construction work included routine repoling and reconstruction of existing facilities to provide for increased capacity and maintenance. In several rural areas the cutover of existing lines and stations to 4-kv. or 12-kv. operation was continued. In one metropolitan area a 4-kv. loop line was added and the line was insulated for future operation at 33 kv. An existing line, operated as an isolated system, has been connected to the existing transmission system through a new 3,000-kva. substation. The existing line is being rebuilt for 34.5-kv. operation and extended to provide loop service to a mountain area frequently subjected to severe snow and sleet conditions. New substations totaling 600 kva. are being built along the new line to serve contiguous areas from the trunk line. The underground distribution system in one metropolitan area has been extended to provide for new load coming on, as well as to take care of increases in existing load. The total net increase in distribution substation capacity, including the above named stations, has been approximately 15,000 kva.

1951 Budget

The generating plants budget for 1951 is dominated by the construction program for the 60,000-kw. fuel-electric plant to be under way most of the year. The principal items of ex-

Status of Western REA-Financed Systems

System	Cumulative Construction Loans 12-31-50	1950 Construction Loans	Miles Energ. 12-1-50	Consumers Connected 12-1-50
ARIZONA	**$14,230,906**	**$ 95,000**	**2,427†**	**8,982†**
Navopache Elec. Co-op., Lakeside	2,538,000	.....	546	2,126
Sulphur Springs Valley Elec. Co-op., Wilcox	4,088,000	.....	647	2,760
Littlefield Elec. Co-op., Littlefield	20,000	.....	1†	12†
Graham County Elec. Co-op., Pima	3,050,500	.....	365	1,890
Trico Elec. Co-op., Tucson	2,556,368	.....	197	275
Verde Elec. Co-op., Lakeside	340,752	.....	100	289
Mohave Elec. Co-op., Kingman	645,000	95,000	163	332
Duncan Valley Elec. Co-op., Duncan	750,000	.....	175	767
Stonewall Elec. Co., Tucson	100,000‡	.....	116†	200†
San Carlos Irrig. & Drainage Dist., Coolidge	142,286‡	.....	117†	331†
CALIFORNIA	**$10,722,178**	**$ 4,885,000**	**2,369†**	**12,666†**
Imperial Irrig. Dist., Imperial	700,000	.....	770†	4,000†
San Luis Valley Rural Elec. Co-op., Monte Vista	1,684,000	.....	997	2,350
Plumas-Sierra Rural Elec. Co-op., Portola	1,237,000	90,000	434	1,070
Mountain Empire Elec. Co-op., Campo	417,000	.....	200	951
Sacramento MUD, Sacramento	5,325,000	3,925,000	109†	4,778†
Inter Valley Elec. Co-op., Invokern	540,000	540,000	*	*
Mesa Elec. Co-op., Phelan	67,829‡	.....	*	*
Klamath River Elec. Co-op., Hornbrook	43,849‡	.....	3†	80†
COLORADO	**$43,851,976**	**$10,066,000**	**16,437†**	**45,368†**
Grand Valley Rural Power Lines, Grand Junction	1,329,000	550,000	534	2,613
San Luis Valley Rural Elec. Co-op., Monte Vista	1,684,000	.....	997	2,350
Morgan County Rural Elec. Assn., Fort Morgan	2,601,000	875,000	874	2,557
Intermountain Rural Elec. Assn., Littleton	3,774,000	1,430,000	1,691	4,490
Southeast Colorado Power Assn., La Junta	6,257,810	3,332,000	1,823	4,272
Gunnison County Elec. Assn., Crested Butte	335,000	.....	209	575
Delta Montrose Rural Power Lines Assn., Delta	1,294,000	.....	683†	2,050†
Union Rural Elec. Assn., Brighton	1,802,000	.....	772	2,399
San Isabel Elec. Assn., Pueblo	1,070,000	.....	432†	1,152†
San Miguel Power Assn., Nucla	721,000	.....	218	813
Highline Elec. Assn., Holyoke	2,898,477	652,000	1,848	3,221
Poudre Valley Rural Elec. Assn., Fort Collins	1,663,000	377,000	952	2,759
La Plata Elec. Assn., Durango	1,370,000	310,000	524	1,589
Empire Elec. Assn., Cortez	1,605,448	.....	610	3,286
Holy Cross Elec. Assn., Glenwood Springs	925,000	195,000	327†	1,131†
Sangre De Cristo Elec. Assn., Salida	1,222,000	.....	364	875
Yampa Valley Elec. Assn., Steamboat Springs	996,000	.....	519	1,082
Mountain View Elec. Assn., Limon	3,937,000	1,020,000	1,977	3,072
Y-W Elec. Assn., Akron	2,980,000	455,000	644	1,786
K. C. Elec. Assn., Hugo	3,575,000	.....	171	1,799
White River Elec. Assn., Meeker	838,500	.....	180	788
Monument Elec. Co., Trinidad	128,741	25,000	79†	453†
North Park Rural Elec. Assn., Walden	845,000	845,000	9†	256†
IDAHO	**$12,283,295**	**$ 3,458,000**	**5,130†**	**12,373†**
Northern Lights, Sandpoint	2,029,750	400,000	917	2,325
Clearwater Valley L & P Assn., Lewiston	3,663,000	640,000	1,683	3,849
Kootenai Rural Electrif. Assn., Coeur d'Alene	1,061,000	.....	657	1,797
Idaho County L & P Co-op. Assn., Grangeville	893,500	.....	566	1,042
Raft River Rural Elec. Co-op., Malta	1,076,000	670,000	225	413
Fall River Rural Elec. Co-op., Ashton	1,075,000	.....	527†	1,459†
Lost River Elec. Co-op., Mackay	1,012,000	633,000	224	893
Prairie Power Co-op., Fairfield	362,000	200,000	166	175
Salmon River Elec. Co-op., Challis	915,000	915,000	*	*
Long Valley Power Co-op., Donnelly	196,045‡	.....	165†	420†
MONTANA	**$33,824,697**	**$ 5,926,000**	**15,869†**	**27,653†**
Ravalli County Electric Co-op., Corvallis	676,700	200,000	331	800
Sun River Elec. Co-op., Fairfield	2,004,500	120,000	1,552	2,136
Lower Yellowstone Rural Elec., Assn., Sidney	1,131,600	.....	794	1,186
Yellowstone Valley Elec. Co-op., Huntley	1,288,498	.....	839	2,107
Vigilante Elec. Co-op., Dillon	2,233,000	500,000	1,058	1,657
Missoula Elec. Co-op., Missoula	1,135,000	190,000	389	727
Flathead Elec. Co-op., Kalispell	1,210,000	170,000	517	1,631
Fergus Elec. Co-op., Lewistown	2,468,000	185,000	1,558	2,130
Park Elec. Co-op., Livingston	1,066,000	100,000	538	1,091
Mid-Yellowstone Elec. Co-op., Hysham	560,000	.....	312	613
Beartooth Elec. Co-op., Red Lodge	1,292,000	.....	874	1,542
Big Horn County Elec. Co-op., Lodge Grass	1,207,000	205,000	614	1,143
Big Flat Elec. Co-op., Turner	469,000	.....	337	409
Sheridan County Elec. Co-op., Medicine Lake	2,640,000	335,000	942	1,217
Northern Elec. Co-op., Opheim	1,540,000	185,000	604	799
Valley County Elec. Co-op., Glasgow	860,000	25,000	431	628
McCone County Elec. Co-op., Circle	2,317,399	1,310,000	479	1,017
Goldenwest Elec. Co-op., Wilbaux	1,139,000	150,000	618	640
Glacier County Elec. Co-op., Cut Bank	1,706,000	825,000	283	2,156
Marias River Elec. Co-op., Shelby	1,911,000	256,000	625	1,974
Hill County Elec. Co-op., Havre	2,450,000	.....	1,622	1,223
Tongue River Elec. Co-op., Terry	1,276,000	885,000	242	187
Southeast Elec. Co-op., Ekalaka	500,000	.....	245†	424†
Lincoln Elec. Co-op., Eureka	590,000	175,000	16	26
Elmo Elec. Co-op. Assn., Polson	220,000	110,000	49†	190†
NEVADA	**$ 316,000**	.....	**164**	**720**
Alamo Power Dist. No. 3, Alamo	99,000	.....	35	88
Overton Power Dist. No. 5, Overton	217,000	.....	129	632

penditure at hydroelectric plants include the replacement of approximately 1,800 ft. of wood-stave flowline, 1,200 ft. of steel diversion pipe, improvements at an existing intake dam, construction of a road to a storage reservoir and miscellaneous improvements to buildings.

The principal items in the 1951 transmission budget, in addition to routine repoling and strengthening of structures, include preliminary work in connection with construction of connecting lines to the new fuel-electric plant, and the extension of supervisory control of switching facilities at a main-line substation. During the early part of the year construction work will be under way on 21 miles of 115-kv. transmission line and terminal structures including a 6,000-kva. substation.

The appropriation set up for the 1951 distribution budget is predominately for expansion, reconstruction of existing distribution lines and substations and reconductoring. Under the heading of expansion is included approximately 36,000 kva. in substation transformer capacity; extension of 34.5-kv. connecting lines to a new urban substation; routine expansion of distribution facilities; modernization and addition of oil circuit breakers; addition of voltage regulators; extension of the underground distribution system in selected areas; and the construction of commercial office and storeroom buildings. System-wide reconstruction of older sections of distribution facilities is scheduled in order to provide for increased capacity, maintenance of existing lines, cutover of existing facilities to 4-kv. or 12-kv. operation, reconductoring and repoling.—*W. T. Johnson, vice-president and executive engineer.*

California-Pacific Utilities

Construction completed in 1950 covered the following categories:

Transmission—To increase capacity a 25-mile section of 34.5-kv. transmission line was reinsulated and rebuilt for operation at 60 kv. Since it was impossible to take the line out of service, the entire job was done with live line tools. The work included reinsulating the high-voltage bus and replacing the transformers at one substation. Total outage time during the entire job was less than 12 hours and the hot work was completed without an accident. Other transmission line work was principally devoted to rebuilding existing lines and increasing conductor sizes to handle rapidly increasing load. Transmission substation capacity was increased at many points

System	Cumulative Construction Loans 12-31-50	1950 Construction Loans	Miles Energ. 12-1-50	Consumers Connected 12-1-50
NEW MEXICO	**$34,146,975**	**$ 8,453,000**	**8,953†**	**28,212†**
Central Valley Elec. Co-op., Artesia	2,316,000	365,000	537	1,552
Roosevelt County Elec. Co-op., Portales	2,202,000	390,000	1,019	2,310
Farmers' Elec. Co-op., Clovis	3,176,000	...	1,789	3,522
Kit Carson Elect. Co-op., Taos	2,208,775	...	605	3,548
Otero County Elec. Co-op., Cloudcroft	1,341,000	225,000	509	1,358
Stonewall Elec. Co., Albuquerque	224,500	...	338†	828†
Mora-San Miguel Elec. Co-op., Mora	1,163,000	335,000	520	1,306
Northern Rio Arriba Elec. Co-op., Chama	710,000	...	40	449
Sierra Elec. Co-op., Truth or Consequences	410,000	...	232	399
Springer Elec. Co-op., Springer	2,092,000	1,170,000	667	729
The Socorro Elec. Co-op., Socorro	2,473,200	1,763,000	235	2,106
Central New Mexico Elec. Co-op., Corona	2,827,500	1,560,000	975	2,189
Continental Divide Elec. Co-op., Grants	2,625,000	...	470	1,587
Lea County Elec. Co-op., Lovington	2,908,000	...	191	1,828
Columbus Elec. Co-op., Columbus	1,990,000	1,690,000	125†	189†
Southwestern Elec. Co-op., Clayton	1,410,000	860,000	470	484
Jamez Mountains Elec. Co-op., Espanola	4,070,000	95,000	231	3,828
OREGON	**$25,288,354**	**$ 4,155,000**	**6,766†**	**23,195†**
Blachly-Lane County Co-op., Elec. Assn., Blachly	822,000	...	254	1,141
Benton-Lincoln Elec. Co-op., Corvallis	3,830,000	475,000	1,191	3,906
Umatilla Elec. Co-op. Assn., Hermiston	1,173,000	660,000	363	1,673
Douglas Elec. Co-op., Roseburg	2,249,500	300,000	595	2,670
Lane County Elec. Co-op., Eugene	2,663,600	805,000	593	3,815
Coos Elec. Co-op., Coquille	2,874,000	205,000	513	2,829
Northeast Clackamas Co. Elec. Co-op., Sandy	1,064,000	350,000	170	678
Tillamook PUD, Tillamook	300,000	...	62	275
Central Elec. Co-op., Redmond	1,776,000	...	486	1,425
Wasco Elec. Co-op., The Dalles	1,931,000	...	1,024	1,314
Columbia Basin Elec. Co-op., Heppner	1,250,000	390,000	690	425
West Oregon Elec. Co-op., Vernonia	1,644,000	445,000	338	2,044
Eastern Oregon Elec. Co-op. Assn., Pendleton	465,000	...	118	288
Columbia Power Co-op. Assn., Spray	2,230,000	...	*	*
Malheur Co-op. Elec. Assn., Vale	463,670‡	...	365†	621†
Jordan Valley Elec. Co-op., Jordan Valley	27,584‡	...	4†	9†‡
Midstate Elec. Co-op., LaPine	525,000	525,000	*	*
UTAH	**$11,794,500**	...	**1,244†**	**3,449†**
Garkane Power Assn., Richfield	1,189,500	...	463	1,596
Moon Lake Elec. Assn., Mt. Emmons	1,036,000	...	608	1,577
Beaver Valley Elec. Assn., Beaver City	24,000	...	13†	45†
Escalante Valley Elec. Assn., Beryl	825,000	...	100	136
Flowell Elec. Assn., Fillmore	34,000	...	30†	63†
Dixie Rural Elec. Assn., St. George	501,000	...	30†	32†
Southwest Utah Power Fed., Cedar City	7,885,000	...	*	*
Utah-Arizona Elec. Assn., Kanab	300,000	...	*	*
WASHINGTON	**$25,986,599**	**$ 2,416,000**	**11,570†**	**28,271†**
Benton Rural Elec. Assn., Prosser	2,394,500	...	1,250	2,385
Orcas P & L Co., Eastsound	1,277,000	...	283	1,295
Mutual P & L Assn., North Bend	66,919	29,000	19†	66†
PUD No. 1 of Klickitat County, Goldendale	2,365,000	320,000	531†	1,520†
Inland Empire Rural Electrif., Spokane	4,008,280	710,000	2,832	5,471
Columbia County Rural Elec. Assn., Dayton	1,062,000	...	702	943
Quinault Light Co., Quinault	125,000	...	33	259
PUD No. 1, Chehalis	467,752‡	...	330†	1,817†
PUD No. 1 of Kittitas County, Ellensburg	443,000	197,000	216	486
Stevens County Elec. Co-op., Colville	2,248,000	130,000	999	2,184
Chelan County Elec. Co-op., Leavenworth	231,000	...	94	268
Okanogan County Elec. Co-op., Winthrop	225,000	...	126	460
Pend Oreille Elec. Co-op., Newport	961,000	...	470	952
Big Bend Elec. Co-op., Ritzville	1,607,000	...	1,025	917
Lincoln Elec. Co-op., Davenport	1,507,000	...	1,109	1,066
Nespelem Valley Elec. Co-op., Nespelem	521,000	...	222	656
Molson-Chesaw Elec. Co-op., Molson	265,000	265,000	*	*
PUD No. 1 of Clallam County, Sequim	1,166,000	545,000	40†	721†
Ferry County PUD No. 1, Republic	930,000	220,000	285	863
PUD No. 1 of Douglas County, Bridgeport	3,172,000	...	690†	3,846†
Mason County PUD No. 1, Shelton	170,000	...	46	175
PUD No. 1 of Pend Oreille County, Newport	213,956‡	...	59†	498†
PUD No. 1 of Cowlitz County, Longview	201,192‡	...	185†	680†
PUD No. 2 of Grant County, Ephrata	359,000‡	...	24†	743†
WYOMING	**$17,627,307**	**$ 2,466,000**	**7,509†**	**13,813†**
Riverton Valley Elec. Assn., Riverton	1,015,000	284,000	603	1,064
Big Horn Rural Elec. Co., Basin	1,013,000	...	496	1,288
Wyrulec Co., Lingle	1,739,600	...	1,029	1,769
Bridger Valley Elec. Assn., Mountain View	1,073,801	660,000	197	561
Wheatland Rural Electrif. Assn., Wheatland	921,000	320,000	519	802
Lower Valley P & L, Freedom	1,496,606	175,000	263	1,175
Garland L & P Co., Powell	375,300	180,000	133	377
Washakie Rural Elec. Co., Worland	172,500	64,000	93	228
Rural Elec. Co., Pine Bluffs	2,267,000	78,000	1,776	2,491
Hot Springs Co. Rural Elec. Assn., Thermopolis	1,240,000	550,000	270	510
Carbon P & L, Saratoga	1,057,054	155,000	540	1,086
Niobrara Elec. Assn., Lusk	1,151,000	...	319	592
Shoshone River Power, Cody	415,000	...	271	299
Sheridan-Johnson Rural Elec. Assn., Sheridan	1,100,000	...	230†	347†
Tri-County Rural Elec. Assn., Sundance	2,511,746	...	605	996
Sheridan Suburban Elec. Co., Sheridan	78,700‡	...	165†	228†

* Not energized † Estimate ‡ Loan Repaid

Current and Future Power Transmission Lines on USBR Projects

Project	State or States	Line terminals: Terminal "A"	Terminal "B"	Rating in kilovolts	Line length in miles	Construction Type	Estimated Year of Completion
Boise	Idaho	Anderson Ranch power plant	Mountain Home sub.	115	20	wood pole, H frame	1950
Yakima	Washington	Roza pump. plant No. 1	Roza pump. plant No. 17	34.5	62	single pole, wood	1950
Yakima	Washington	Roza pump. plant No. 1	Roza diversion dam	13.3	2.56	single pole, wood	1950
Palisades	Idaho	Palisades power plant	Goshen	115	50	wood pole, H frame	1951
Columbia Basin	Washington	B.P.A. transmission line	Quincy pump. plant	115	2	wood pole, H frame	1950
Central Valley	California	Oroville	Elverta	230	56	steel tower	1950
Central Valley	California	Elverta	Perkins	230	17	steel tower dble cir.	1951
Central Valley	California	Perkins	Tracy	230	56	steel tower	1951
Central Valley	California	Shasta power plant	Tracy	230	217	steel tower, dble cir.	1951
Central Valley	California	Contra Costa substation	Clayton & Ygnacio pump. plants	69	18	wood pole, H frame	1950
Central Valley	California	Tracy switchyard	Contra Costa sub.	69	17	wood pole, H frame	1951
Davis Dam	Arizona	Davis power plant	Parker power plant	230	70	steel tower	1950
Davis Dam	Arizona	Davis power plant	Prescott substation	230	145	steel tower	1950
Davis Dam	Arizona	Prescott substation	USBR 230-kv. Mesa sub.	230	125	steel tower	1951
Davis Dam	Ariz.-Nev.	Davis switchyard	Hoover switchyard	230	64	steel tower	1950
Davis Dam	Ariz.-Calif.	Parker switchyard	Gila Drop 4 line tap at Pilot Knob	161	123	wood pole, H frame	1950
Davis Dam	Arizona	Coolidge substation	E.D. 5 substation	115	30	wood pole, H frame	1950
Davis Dam	Arizona	USBR, 230-kv. Mesa sub.	Coolidge substation	230	40	steel tower	1951
Davis Dam	Arizona	Tucson substation	Cochise substation	115	78.4	wood pole, H frame	1950
Davis Dam	Arizona	Gila substation	Wellton-Mohawk pump. plants	34.5	21.5	single pole, wood	1950
Rio Grande	New Mexico	Socorro	Albuquerque	115	80	wood pole, H frame	1951
Rio Grande	New Mexico	Belen	Willard	115	53	wood pole, H frame	1951
Rio Grande	New Mexico	Elephant Butte-Deming line tap	Hot Springs sub.	115	1.5	wood pole, H frame	1950
Fort Peck	Montana	Havre	Shelby	115	100	wood pole, H frame	1951
Fort Peck	Montana-ND	Glendive	Williston	115	105	wood pole, H frame	1953
Fort Peck	Montana	Ft. Peck power plant	Glasgow bench	69	14	wood pole, H frame	1951
Mo. River Basin	N. Dakota	Garrison Dam	Bismarck	230	65	double circ. st. tower	1951
Mo. River Basin	N. Dakota	Bismarck	Jamestown	230	105	steel tower	1951
Mo. River Basin	N. Dakota	Garrison Dam	Devils Lake	115	174	wood pole, H frame	1951
Mo. River Basin	N. Dakota	Devils Lake	Lakota	115	28	wood pole, H frame	1951
Mo. River Basin	N. Dakota	Devils Lake	Jamestown	115	102	wood pole, H frame	1951
Mo. River Basin	N. Dakota	Jamestown	Edgeley	115	38	wood pole, H frame	1950
Mo. River Basin	N. Dakota	Edgeley	Foreman	69	62	wood pole, H frame	1951
Mo. River Basin	N. Dakota	Jamestown	Valley City	115	37	wood pole, H frame	1951
Mo. River Basin	N. Dakota	Leeds	Rolla	69	40	wood pole, H frame	1950
Mo. River Basin	Wyo.-Mont.	Lovell	Yellowtail	115	50	wood pole, H frame	1952
Mo. River Basin	Wyoming	Garland substation No. 2	Lovell	69	18	wood pole, H frame	1952
Mo. River Basin	Wyoming	Boysen power plant	Thermopolis	115	18	wood pole, H frame	1951
Mo. River Basin	N. Dakota	Bismarck	De Vaul substation	69	42	wood pole, H frame	1951
Mo. River Basin	Wyoming	Boysen power plant	Alcova substation	115	110	wood pole, H frame	1952
Mo. River Basin	Wyoming	Boysen power plant	Shoshoni	34.5	12	single pole, wood	1952
Mo. River Basin	Wyoming	Shoshoni	Riverton	34.5	24	single pole, wood	1952
Mo. River Basin	Montana	Canyon Ferry power plant	Great Falls	115	80	wood pole, H frame	1952
Mo. River Basin	Wyoming	Thermopolis	Lovell	115	100	wood pole, H frame	1952
Mo. River Basin	Wyoming	Thermopolis	Owl Creek	34.5	4.5	single pole, wood	1952
Mo. River Basin	Wyoming	Owl Creek	Lovell	34.4	95.5	single pole, wood	1954
Mo. River Basin	S. Dakota	Sioux Falls	Brookings	115	60	wood pole, H frame	1951
Mo. River Basin	S. Dakota	Brookings	Watertown	115	60	wood pole, H frame	1951
Mo. River Basin	S. Dakota	Watertown	Huron	115	185	wood pole, H frame	1951
Mo. River Basin	S. Dakota	Armour	Huron	115	78	wood pole, H frame	1951
Mo. River Basin	S. Dakota	Fort Randall tap	Armour	115	20	wood pole, H frame	1951
Mo. River Basin	S. Dakota	Gavins Point tap	Fort Randall tap	115	50	wood pole, H frame	1951
Mo. River Basin	S. Dakota	Sioux Falls	Gavins Point tap	115	90	wood pole, H frame	1951
Mo. River Basin	S. Dakota	Fort Randall Dam	Winner	115	72	wood pole, H frame	1952
Mo. River Basin	S. Dakota	Rapid City	Midland	115	112	wood pole, H frame	1952
Mo. River Basin	S. Dakota	Fort Randall Dam	Oahe Dam site	230	167	steel tower, dble cir.	1954
Mo. River Basin	S. Dakota	Oahe Dam Site	Mobridge	230	96	steel tower	1954
Mo. River Basin	S. Dak.-N. Dak.	Mobridge	Bismarck	230	119	steel tower	1954
Mo. River Basin	S. Dak.-Iowa	Fort Randall Dam	Sioux City	230	134	steel tower	1954
Mo. River Basin	Wyo.-Nebr.	Casper	Gering	115	174	wood pole, H frame	1950
Mo. River Basin	Nebraska	Gering	Sidney	115	69	wood pole, H frame	1950
Mo. River Basin	Colo.-Nebr.	Sterling	Sidney	115	39	wood pole, H frame	1950
Mo. River Basin	Colo.-Nebr.	Sidney	Ogallala	115	69	wood pole, H frame	1950
Mo. River Basin	Wyoming	Cheyenne	Pine Bluff	115	31.4	wood pole, H frame	1950
Mo. River Basin	Nebraska	Gering	Alliance	115	45	wood pole, H frame	1950
Mo. River Basin	S. Dak.-Nebr.	Fort Randall Dam	O'Neil	115	45	wood pole, H frame	1951
Mo. River Basin	Nebraska	Alliance	Chadron	115	55	wood pole, H frame	1951
Mo. River Basin	Wyoming	Seminoe power plant	Sinclair	115	34	wood pole, H frame	1951
Mo. River Basin	Wyoming	Sinclair	Rock Springs	115	115	wood pole, H frame	1954
Mo. River Basin	Iowa-Nebr.	Sioux City	Omaha	230	120	steel tower	1954
Mo. River Basin	Iowa	Sioux City	Storm Lake	115	60	wood pole, H frame	1953
Mo. River Basin	Iowa	Sioux City	Sibley	115	80	wood pole, H frame	1953
Mo. River Basin	Nebr. Colo.	Sidney-Ogallala trans. line	Julesburg	115	8	wood pole, H frame	1951
Mo. River Basin	Wyo.-Nebr.	Pine Bluffs	Kimball	34.5	24	single pole, wood	1952
Mo. River Basin	Iowa	Storm Lake	Harlan	115	65	wood pole, H frame	1953
Mo. River Basin	Nebraska	Ogallala	North Platte	115	52	wood pole, H frame	1954
Mo. River Basin	Wyoming	Alcova power plant	Cheyenne	115	145	wood pole, H frame	1954
Kendrick	Wyoming	Seminoe power plant	Bairoil	34.5	32	single pole, wood	1951
Kendrick	Wyoming	Hanna	Sinclair	34.5	38	single pole, wood	1952
Colo.-Big Thompson	Colorado	West Portal, Adams tunnel	East Portal, Adams tu.	69	13	Cable in Adams tun.	1950
Colo.-Big Thompson	Colorado	East Portal, Adams Tunnel	Estes power plant	69	6	wood pole, H frame	1950
Colo.-Big Thompson	Colorado	Flatiron switchyard	Greeley	115	28	wood pole, H frame	1950
Colo.-Big Thompson	Colorado	Estes power plant	Marys Lake power pl.	115	3.5	steel tower & H frame wood poles	1950
Colo.-Big Thompson	Colorado	Brush	Yuma	69	51	wood pole, H frame	1950
Colo.-Big Thompson	Colorado	Wiggins	Hoyt	115	17	wood pole, H frame	1950
Colo.-Big Thompson	Colorado	Kremmling tap	Oak Creek	115	65	wood pole, H frame	1951
Colo.-Big Thompson	Colorado	Flatiron switchyard	Cheyenne-Greeley tr. line	115	36	wood pole, H frame	1952
Colo.-Big Thompson	Colorado	Gore Junction	Muddy Pass	69	18.5	wood pole, H frame	1952
Colo.-Big Thompson	Colorado	Flatiron substation	Leyner switchyard	115	25	wood pole, H frame	1950
Colo.-Big Thompson	Colorado	Leyner switchyard	Brighton	115	14	wood pole, H frame	1950
Colo.-Big Thompson	Colorado	Brighton	Brush	115	72	wood pole, H frame	1952
Colo.-Big Thompson	Colorado	Flatiron switchyard	Pole Hill power pl.	115	5	wood pole, H frame	1950
Colo.-Big Thompson	Colorado	Brush	Limon	115	73	wood pole, H frame	1950
Colo.-Big Thompson	Colorado	Salida	Gunnison	115	60	wood pole, H frame	1952
Colo.-Big Thompson	Colorado	Yuma	Wray	69	26	wood pole, H frame	1950
Eklutna	Alaska	Eklutna hydro plant	Eklutna constr. site	115	12	wood pole, H frame	1951
Eklutna	Alaska	Eklutna constr. site	Palmer	69	14	wood pole, H frame	1951

Current and Future Development on USBR Projects (Power Plants)

Project	State	River	Purpose*	Name of plant	Year Initial Operation	Present kw.	Present No. of Units	Ultimate kw.	Ultimate No. of Units
Boise	Idaho	South Fork, Boise	Irr.-P.	Anderson Ranch	1950	27,000	2	27,000	2
Palisades	Idaho	Snake	Irr.-P.	Palisades	1956	0	0	112,500	Undetermined
Hungry Horse	Mont.	Flathead	Irr.-P.	Hungry Horse	1952	0	0	284,000	4
Columbia Basin	Wash.	Columbia	Irr., F.C., P.	Grand Coulee	1941	1,637,500	17	1,974,000	21
Minidoka	Idaho	Snake	Irr.-P.	American Falls	1953	0	0	30,000	2
Yakima	Wash.	Yakima	Irr.-P.	Chandler	1955	0	0	12,000	2
Yakima	Wash.	Roza Canal	Irr.-P.	Roza	1954	0	0	10,000	2
Central Valley	Calif.	American	F.C.-P.	Folsom	1955	0	0	165,000	3
Central Valley	Calif.	American	F.C.-P.	Nimbus	1955	0	0	5,000	2
Boulder Canyon	Ariz.-Nev.	Colorado	Irr., F.C., P.	Hoover	1936	1,034,800	15	1,322,300	19
Davis Dam	Ariz.-Nev.	Colorado	Irr., F.C., P.	Davis	1951	0	0	225,000	5
Mo. River Basin	Wyo.	Big Horn	Irr., F.C., P.	Boysen	1952	0	0	15,000	2
Mo. River Basin	So. Dak.	Cheyenne	Irr., F.C., P.	Angostura	1951	0	0	1,200	1
Mo. River Basin	Mont.	Missouri	Irr., F.C., P.	Canyon Ferry	1953	0	0	50,000	3
Mo. River Basin	Mont.	Big Horn	Irr., F.C., P.	Yellowtail	1956	0	0	200,000	4
Mo. River Basin	Mont.	Marias	Irr., F.C., P.	Tiber	1955	0	0	2,000	Undetermined
Mo. River Basin	Mont.	Missouri	Irr.-P.	Little Porcupine	1954	0	0	18,000	3
Mo. River Basin	No. Dak.	Souris	Irr., F.C., P.	Crosby	1958	0	0	48,000	Undetermined
Mo. River Basin	No. Dak.	Souris	Irr., F.C., P.	Des Lacs	1958	0	0	60,000	Undetermined
Mo. River Basin	So. Dak.	Mo.-Oahe Canal	Irr.-P.	Miller Drop	1959	0	0	180,000	Undetermined
Colo.-Big Thompson	Colo.	Transmountain Diversion	Irr.-P.	Mary's Lake	1951	0	0	8,100	1
Colo.-Big Thompson	Colo.	Transmountain Diversion	Irr.-P.	Estes	1950	30,000	2	45,000	3
Colo.-Big Thompson	Colo.	Transmountain Diversion	Irr.-P.	Flatiron	1953	0	0	63,000	2
Colo.-Big Thompson	Colo.	Transmountain Diversion	Irr.-P.	Pole Hill	1953	0	0	33,250	1
Mo. River Basin	Wyo.	North Platte	P	Kortes	1950	36,000	3	36,000	3
Kendrick	Wyo.	North Platte	P	Alcova	1954	36,000	3	36,000	3
Mo. River Basin	Wyo.	North Platte	Irr., F.C., P.	Glendo	1956	0	0	24,000	Undetermined
Mo. River Basin	Wyo.	North Platte	Irr., F.C., P.	Fremont Canyon	1956	0	0	48,000	Undetermined
Mo. River Basin	Nebr.	Loup	Irr., F.C., P.	Davis Creek	1957	0	0	11,000	Undetermined
Mo. River Basin	Nebr.	Loup	Irr., F.C., P.	Pleasant Hill	1957	0	0	2,600	Undetermined
Eklutna	Alaska	Eklutna Lake Diversion	P	Eklutna	1954	0	0	30,000	4

*Abbreviations under Purpose: Irr.—Irrigation; P.—Power; F.C.—Flood control.

to provide for present and anticipated load growth.

Distribution — Distribution transformer capacity was greatly increased in all areas to handle increased load of existing customers and to provide capacity for new customers. Distribution primary capacities were greatly increased.

Rural lines—Rural extensions added approximately 300 consumers in the various service areas of the company and as a result these areas have nearly complete coverage.

1951 Construction—As planned, the 1951 program consists principally of increasing substation and distribution capacities to provide for anticipated load growth. Rural extensions planned will give nearly 100% coverage of our rural areas. However, shortages and restrictions on the use of critical materials may make it impossible to complete the work planned.—*E. K. Albert, vice-president and chief engineer.*

Central Valley Project, USBR

The last of the three 25,000-kw. generators at Keswick power plant was placed on the line in April, thus completing the primary hydroelectric facilities for the Central Valley project. Installation of the steel and concrete discharge pipes for the Tracy pumping plant was completed in November. Work on the installation of miscellaneous electrical and mechanical equipment for the pumping plant is continuing. Construction of the Tracy switchyard is about 85% completed.

In various stages of construction are the following transmission lines: Perkins-Tracy, 230-kv., 56 miles; Shasta-Tracy, 230-kv., 217 miles; Elverta-Perkins, 230-kv., 17 miles; Tracy-Contra Costa, 69-kv., 20 miles.

Coast Counties G&E

Coast Counties Gas and Electric expended approximately $1,240,000 for new and improved facilities and $280,000 for replacements during 1950. The present estimate for 1951 is $1,400,000 for new and improved facilities and $300,000 for replacements. During 1950 seven new rural distribution substations and one transmission substation were placed in operation, and the Santa Cruz-Watsonville 110-kv. transmission line was completed. Coast Counties peak for 1950 was 49,500 kw. Compared with 44,080 kw. for 1949, this was an increase of 12.5%.

It is anticipated that in 1951 the following program will be completed: Installation of four new unit substations and replacement of two substations with unit type substations; construction of a new transmission substation in the vicinity of Santa Cruz; and construction of a new 110-kv. twin-circuit line from our system purchase point into our Green Valley substation at Watsonville, together with related transformers and other station equipment.

Glendale PS Dept.

New construction work carried on by the city of Glendale was not as extensive during 1950 as in previous years because of curtailment of our budget for capital improvements for the current fiscal year. Underground construction consisted of the completion of several primary cable installation jobs carried over from 1949, plus one small job completed in the first half of the year to eliminate congested overhead construction around one of our most heavily traveled intersections.

Street lighting improvements consisted of increasing the size of lamps in 2,500 existing standards and the installation of center suspension units mounted on self-supporting steel poles on a principal thoroughfare. The program of replacing older overhead lines that have passed their economic life was continued throughout the year. Approximately nine miles of lines were replaced. The expenditures on a fiscal year basis for 1949-50 were $734,000 and the amount appropriated for the current fiscal year is $383,000. No additions were made in substation or generating capacity during the year.

Glendale's load growth was somewhat less during 1950 than in previous years. The peak demand of 38,000 kw. was 2% above that for 1949, while the kwh. consumption of 149,000,000 showed an increase of 5.6%. During the year 1,500 kva. of distri-

bution transformer capacity were added to the system, as well as 1,384 new service connections, the latter being a 16% increase over last year.—*H. E. Gulick, general manager and chief engineer.*

Imperial Irrigation District

Expenditures for 1950 by the Imperial Irrigation District amounted to approximately $2,900,000 for new and improved facilities to the generation, transmission and distribution plant. An estimated amount of $3,000,000 will be expended during 1951.

The installation of 10,000 kw. in hydroelectric generating capacity at Drop No. 4 on the All-American Canal was completed in August 1950. This brings the total capacity of this plant up to 19,600-kw., nameplate rating. An additional 30,000 kw. in steam-electric generating capacity is in the process of construction and should be completed in the first part of 1952. This, added to the existing plant, will make a total of 50,000 kw. in steam-electric generating capacity.

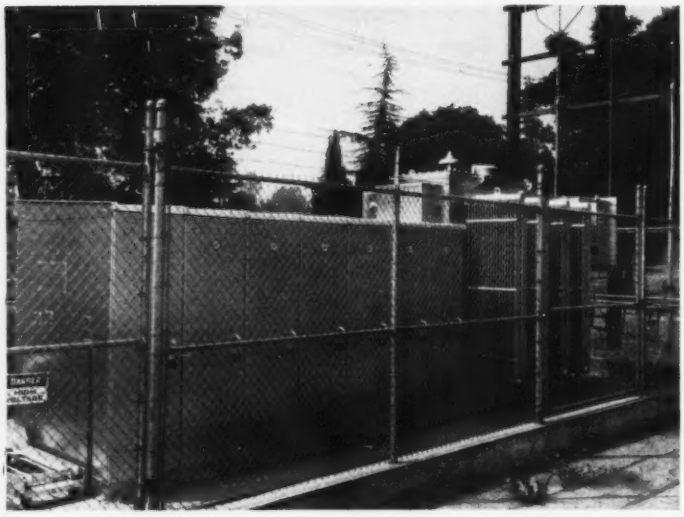
Construction of 25 miles of 161-kv. transmission line between Drop No. 4 hydro plant and El Centro is scheduled to start sometime in February 1951. The function of this line will be to transmit Parker Dam and Davis Dam power into El Centro switching station. Reconstruction of the 34.5-kv. line to 92 kv. between Drop No. 3 and Drop No. 4 is scheduled for 1951. No additions were made to the transmission lines in 1950. Substation transformer capacity was increased approximately 31,000 kva.

The distribution plant was increased by approximately 40 miles of new 12-kv. and 4-kv. lines, and an estimated 7,500 kva. in pole-type distribution transformer capacity was added.

During 1950, approximately 1,650 new meters were connected to the system. Because of unusually mild weather during the months of June and December, the peak for 1950 did not exceed the 59,000-kw. peak for 1949. However, kilowatt-hour sales for 1950 were 4% above 1949.—*B. A. Weiss, executive engineer.*

Los Angeles Dept. of W&P

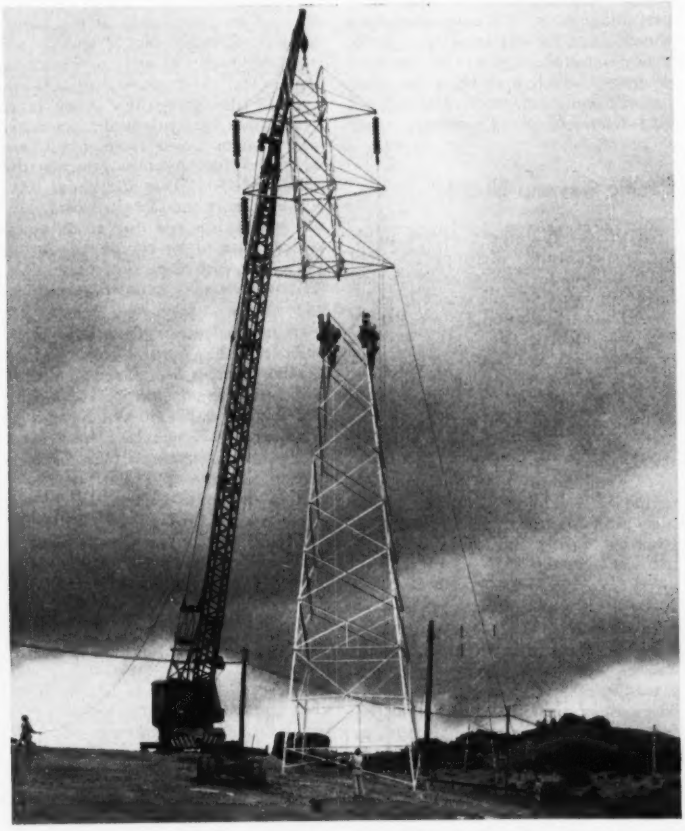
Construction expenditures by the Department of Water & Power for new and improved facilities on the power system in 1950 were approximately $36,950,000. The 1951 program includes provision for expenditures of approximately $41,230,000 for new construction and additions and betterments of existing facilities.



3,000-kva. unit substation was major addition made by Pasadena municipal system

Owens Gorge No. 3 plant, one of three 37,500-kw. plants, Los Angeles Dept. of W&P

Contra Costa steam plant of PG and E with three 100,000-kw. units nears completion



Erecting steel tower on Green Valley-Santa Cruz 110-kv. line of Coast Counties G&E

These amounts are exclusive of land purchases. No new generating capacity was added in 1950 but orders have been placed for two steam-electric generating units and associated boiler units and equipment for installation at a new plant not yet named. The first unit with a maximum capacity of 100,000 kw. is scheduled for operation in November 1953, with a second like unit scheduled for April 1954. The plant will have an ultimate capacity of four such units with completion in 1957 as presently estimated. Additional fuel oil storage and handling facilities were constructed during the year at the Harbor steam plant and the Olympic tank farm. Work continued throughout the year on the Owens Gorge project. Delays because of material shortages and other reasons prevented completion of the first two plants as previously planned for December 1950.

A 60,000-kw. transformer bank was installed at each of receiving stations E and F to provide for additional load growth in the areas served by these stations. The installation of twelve additional 138-kv. current-limiting reactors was completed. Twenty-four 138-kv. current-limiting reactors are now in service on the system to limit short-circuit duties on the 138-kv. oil circuit breakers. Added transformer capacity at other points on the system amounted to 71,900 kva. in distributing substations, 5,250 kva. in ground-type industrial stations and 6,265 kva. in commercial stations. Distribution lines were added as follows: 31.8 miles of 34.5-kv. overhead; 138.6 miles of 4.8-kv. overhead; 4.0 miles of 34.5-kv. underground and 18.5 miles of 4.8-kv. underground. The 1950 system peak, which occurred on Dec. 21, was 846,000 kw.

No new steam generating capacity is scheduled for 1951, but design and engineering will continue on a new steam plant as mentioned previously for initial operation in 1953. The Owens River Gorge hydro project will be completed during the year with two plants estimated to be ready for service in January and March respectively, and the third plant in May. The three plants will add a rated capacity of 112,500 kw. to the system and be interconnected by means of a 258-mile, 230-kv. single-circuit, steel tower transmission line terminating at receiving station E in the San Fernando Valley.

Material shortages and damage of equipment in tests caused delay in the installation of the two 40,000-kva. synchronous condensers which were scheduled for service in 1950. It is expected that the condenser at receiving

station A will go into service by March 1951, and the one at receiving station D by April. The installation of the 146,400-kva. transformer bank on the receiving end of the Owens River Gorge line at receiving station E will be completed by January 1951. Added transformer capacity at other points is estimated to amount to 84,250 kva. at distributing substations, 7,775 kva. at ground-type industrial stations and 11,450 kva. at commercial stations. Other transmission circuits to be constructed include 5.8 miles of 287-kv. and 10.3 miles of double-circuit 138 kv. Distribution lines to be added are estimated at: overhead, 28 miles of 34.5 kv. and 135 miles of 4.8 kv.; underground, 15 miles of 34.5 kv. and 20 miles of 4.8 kv. The system generation peak for 1951 is presently estimated at 925,000 kw.—*C. P. Garman, chief electrical engineer and deputy general manager.*

Magnolia Center, one of several major stations built in 1950 by Riverside El&W Dept.

Modesto Irrigation District

Capital expenditures for 1950 were approximately $350,643, and are anticipated to be $636,000 in 1951. Major plant additions during 1950 included the addition of one bank of 3,000 kva. at receiving substation A, one bank of 1,500 kva. at rural substation E and one bank of 450 kva. at rural substation G. All were 12,000- to 4,160-volt transformers.

Approximately 1.5 miles of 69-kv. transmission lines were added to existing facilities in such a manner as to provide a separate tie line between receiving station A and station L. More than 5.25 miles of 12-kv. transmission lines were constructed and about 17.5 miles of 12- and 4-kv. distribution lines were added to the system. Existing insulators on one 69-kv. tie line were replaced by a new type designed to eliminate unnecessary radio interference. New consumers numbering 1,154 were connected to the system for a gain of 6.1%.

During 1951, major plant additions will consist of one 36,000-kva. bank of 115-kv./69-kv. transformers at major receiving substation J. Of this capacity, 12,000 kva. will be available at 12 kv. Station O, a unit substation, with 5,000 kva. of 69- to 12-kv. capacity will be added to the system during the year. This brings the total number of stations to fourteen. Conversion of 4,000-volt lines to 12,000 volts is expected to continue in order to provide better voltage regulation for present and anticipated rural power demands. Underground vaults and duct run construction is contemplated to provide interconnection between existing facilities and to serve new loads on the district's system.

Consumer growth during 1951 should be approximately the same percentage as in 1950 depending upon the effect of present and future emergency controls, upon the national economy, which may be enforced as a result of the unsettled international situation.—*C. E. Plummer, chief engineer.*

Pacific Gas and Electric

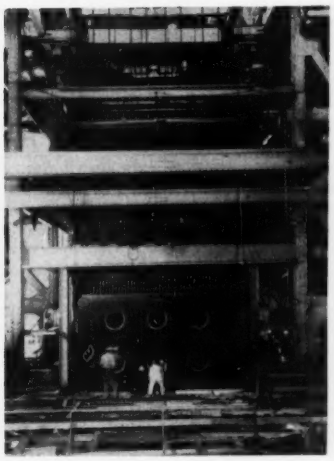
With its expansion program totaling expenditures of approximately $800 million for the postwar period 1946 through 1951, the year 1950 witnessed the installation by the Pacific Gas and Electric Co. of 463,500 kw. of new steam and hydroelectric generation, and the operation of the 502-mile, 34-in. gas line from Topock to Milpitas. During 1950 approximately $107 million were expended on electrical construction as compared with $149.8 million in 1949 and an estimated $104 million for 1951. A new high peak load of 2,509,300 kw. was recorded during July of 1950, a 9% increase over the 1949 peak.

Generation

The second turbogenerator at Kern steam plant, a 100,000-kw. unit, was placed in operation on Jan. 17, 1950. The cost of this plant, including the first unit of 75,000 kw. already in operation, approximated $30 million. Units No. 1 and 2 of the originally planned three 100,000-kw. turbogenerators at Moss Landing steam plant were brought on the line on April 20 and Dec. 20 of 1950, respectively. The third unit is scheduled for operation early in 1951. Recently, two additional 100,000-kw. units were authorized for installation at this plant. These new units, No. 4 and 5, are expected to be placed in service in 1952. The first three 100,000-kw. units of the company's other large steam plant currently under construction, Contra Costa steam plant, are scheduled for operation during the middle of 1951. Two additional 100,000-kw. units for Contra Costa, also recently authorized for installation, are planned to be completed during 1953. The cost of each of these 500,000-kw. plants is estimated at approximately $80 million.

In hydroelectric generation, three units on the North Fork of the Feather River were placed in operation during the past year. The Cresta No. 2 unit, a 37,500-kva. generator driven by a vertical, Francis-type, 46,500-hp. turbine, was placed in operation on Jan. 16, 1950. The No. 1 unit, a duplicate of the No. 2, was put in service on Nov. 29, 1949. The estimated cost of the Cresta plant is $26.4 million. Rock Creek, the other hydro plant completed recently on the Feather River, was placed in service in March 1950. The first of the two 63,000-kva. generators was brought on the line on March 1 and the second on March 15. Each of these generators is connected to a vertical, Francis-type turbine rated at 73,500 hp. The cost of Rock Creek is estimated at $35.4 million.

The original design of the company's Salt Springs power house constructed in 1930, on the North Fork of the Mokelumne River included



Sacramento MUD installs switchgear (left) for underground network. Right: New boiler at Long Beach steam plant, So. Calif. Ed.

space and facilities for a future Bear River unit. This unit, a 33,000-kva. generator driven by a 40,000-hp., vertical shaft, 3-jet, impulse turbine, is now under construction and scheduled for operation in 1953. Although the unit will be installed in Salt Springs power house, it will take water from a separate source, the Bear River (a tributary of the North Fork of the Mokelumne), through the lower Bear reservoir and through a 13,600-ft. pressure tunnel and a 5,000-ft. steel penstock. Additional water will be taken from a diversion structure on Cold Creek, another tributary of the Mokelumne, through a 400-ft. pressure tunnel connecting with the Bear River tunnel. The effective head for which this unit is designed is 1,960 ft. Water will be discharged from the Bear River unit into the flume leading to the company's Tiger Creek plant downstream on the Mokelumne North Fork. The estimated cost of the Bear River unit is $11 million.

Transmission

During 1950 the company installed approximately 617,000 kva. of transmission substation transformer capacity, including 366,000 kva. of step-up transformers at generating plants. An estimated 1,055,000 kva., including step-up capacity of 526,000 kva., is planned for installation during the current year. Each of these figures represents both 230/115- and 115/60-kv. substation capacity.

New transmission lines constructed during 1950 total approximately 320 line miles. Included in the list of major lines completed during the year were the Sunol-Moss Landing 220-kv. and the Moss Landing-Panoche 220-kv., 62 and 67 miles in length, respectively; the Willits-Fort Bragg 60 kv., 30 miles; and the Millbrea-Monte Vista 60 kv., 14 miles of a total proposed 32 miles. A similar amount of transmission approximating 315 line miles is planned for construction during 1951.

Distribution

A considerable number of distribution substations with secondary voltages under 50 kv. were constructed during the past year. Transformer capacity installed at these stations totaled approximately 477,000 kva. A like number, 450,000 kva., is estimated to be installed this year.

Some 68,000 electric customers were connected to the company's system in 1950 and approximately 2,000 line miles of distribution lines were constructed during the year. Practically 90% of this mileage is in rural areas. *—I. C. Steele, vice-president and chief engineer.*

Pasadena L&P Dept.

During the fiscal year 1949-1950 energy sold in Pasadena exceeded the previous year by 4.4%. Total operating expense was slightly less than a year ago. Additions to capital amounted to $1,978,066 which included part of the cost of the 35,000-kw. addition to the steam plant completed in December 1949. Betterments to the distribution system consisted primarily of rebuilding of certain pole lines. Added distribution transformers in service increased the total capacity from 78,131 kva. to 79,777 kva. The number of meters increased from 39,722 to 41,130.

Equipment has been ordered for a new 20,000-kva., 4,160-volt distribution substation to be completed by winter of 1951. Plans for a new dispatching and control building are progressing. We estimate that kilowatt-hour load and demand will increase approximately 8% during the next year. Further expansion of substation and distribution facilities will be necessary during the next few years. Additional steam plant capacity is being planned for completion in 1953-1954. *—E. L. Bettannier, general manager and chief engineer.*

Riverside El&W Dept.

In the operations of the city's electric department during the year 1950 the general program established was approximately completed. Two principal additions occurred, one being property acquisition for new plant quarters and the completion of the preliminary architectural survey; the other being the conclusion reached by the governing board that the department's operations in electrical distribution would be confined to the corporate limits of the city. Therefore, sales were consummated transferring ownership of the fringe lines to the two serving companies, California Electric Power Co. and the Southern California Edison Co., which were established in the general areas affected.

A subtransmission line of approximately 16 miles in length was completed as scheduled serving the city's

Arlington receiving station and picked up the load of the first of the three new substations completed. Two additional substations continuing under construction are scheduled to be completed early in 1951. The continued load development, together with the reconstruction of existing distribution feeders with the additions thereto, required a total distribution line construction of approximately 35 miles during the year.

The controversy arising in the general citrus areas in an attempt to control orchard heating accentuated the installation of wind machines in this area adding a connected load of approximately 2,000 hp. to our system. However, temperature conditions during the year did not call for the operation of these machines to the extent of any added peak demand.

The 1950 system peak reached a demand of 18,500 kw. as compared to 17,344 kw. for the preceding year. The increase was in major part additional domestic customers. Total of all customers added was approximately 1,000. The decision heretofore reached that the city would continue the range and water heater installation program, wherein the city substantially assumes all costs, is proving most valuable and provides a continued increase in the density of this type of equipment.—*L. W. Grayson, general manager and chief engineer.*

Sacramento MUD

During 1950 approximately $2,250,000 were spent for new distribution plant; 7,200 new customers were added, making a total of about 90,700 customers served at year's end; system peak increased from 97,000 kw. in December 1949 to 110,000 kw. in December 1950. To add these new customers, 90 miles of new primary line were constructed; 1,350 new distribution transformers were placed; the necessary secondary and services were constructed and meters installed. To carry the added load on the distribution system, ten miles of 22-kv. line were converted to 60-kv. operation; 100 miles of 4-kv. rural lines were converted to 12-kv. operation; 20,000 kva. of substation capacity were added in the form of 2,000- and 3,000-kva., single-circuit unit substations; 2,000 kvar. of capacitors were installed. Six 500-kva. and three 1,000-kva. network units were added in the underground area. Extensive use of aluminum conductor was made in the overhead system for primaries, secondaries and services.

Budgeted for new construction in 1951 are $2,750,000 for new customer extensions and for system reinforcement following very much the same pattern as that for 1950. Plans include 18,000 kva. in new distribution substations. Also, a new 30,000-kva., 110/22-kv. bulk supply station will be constructed close in to the Sacramento urban load. Peak demand is expected to increase from 110,000 kw. in 1950 to 120,000 kw. in 1951.—*Paul E. Shaad, chief electrical engineer.*

San Diego Gas & Electric

Reflecting the continued growth of San Diego County, the system peak load of the San Diego Gas & Electric Co. at the time of writing stood at 245,000 kw., as compared with a 1949 system peak of 233,000 kw. It was further estimated that the 1950 system peak would reach 255,000 kw. during the latter part of December. Approximately 11,500 electric meters were added during 1950, which is 3,000 greater than the 8,500 installed in 1949. Keeping pace with this ever-increasing demand, the company put into operation in September 1950, another 50,000-kw. turbogenerator, unit No. 3 at its Silver Gate plant. New 69/12-kv. substations were put into operation at Escondido, Rose Canyon, Santa Ysabel, Warner's and Descanso. In addition 12/4-kv. substations were installed, or their capacity increased, at Encinitas, Buena, Encanto, Grossmont, Roseville, Frontier and Bostonia.

Highlight of the 1950 expansion program, costing in the vicinity of $9,000,000, was the completion of the 69,000-volt loop system extending in the back country from El Cajon through Descanso, Santa Ysabel, Warner's, Rincon, Escondido, and thence back to El Cajon. This was accomplished through the construction of the new major transmission substations at Descanso, Santa Ysabel and Warner's. Now power can be conveyed in two directions over this loop. Major transmission substations and customers are thereby assured of greater continuity of service in case of failure of one of the main lines feeding any one of the substations. The largest part of the 73 miles of transmission line added in 1950 was in this loop construction. More than 160 miles of distribution lines were also strung and the voltage of many distribution lines increased from 2,400 to 12,000 volts, thereby greatly raising the capacity of those lines.

Capital expenditures for the year 1951 are budgeted at $8,300,000. Construction will be proceeding rapidly at the company's Silver Gate power plant in preparing for the installation in 1952 of still another 50,000-kw. turbogenerator, unit No. 4. Another major project will be the expansion of the present 69/12-kv. substation at San Luis Rey to 115/69 kv. This substation will serve as a pivot of another back country loop running from San Luis Rey through Escondido, Rincon, Monserate and back to San Luis Rey. In completing this loop, a 69/12-kv. substation will be constructed at Monserate, and a transmission line installed from Camp Pendleton through Monserate and Pala, thence connecting with a 69-kv. line extending out of Rincon to the north. The company further expects to install 12/4-kv. substations at Carlsbad, Serra and Dehesa.

Southern California Edison

A total of $62,500,000 was expended in the year 1950 in net plant additions to generation, substations, transmission lines, distribution lines, and other system betterments. Budgeted for the year 1951 is $60,500,000 for like system additions and betterments.

During the year, 847 line miles of distribution circuits were constructed and 213 line miles of new transmission circuits placed in service. Eleven new distribution substations were constructed during the year with a capacity of 39,500 kva. Transformer capacity of 142,050 kva. was added to existing distribution substations and 32,500 kva. were added to existing transmission substations. Approximately 70,000 new meters and 610,000 hp. of new load were connected to the system during the year.

New Hydro Plant

Construction continued throughout the year on Big Creek No. 4 hydroelectric generating plant and appurtenances. This is the sixth plant of the Big Creek development and will add 84,000 kw. of generating capacity to the system. The dam structure for a storage reservoir of 35,000 acre-ft. is complete except for minor work. The reservoir was filled following the heavy rains and run off during the latter part of November. The tunnels are driven through; linings are being installed in those sections where lining is required; and connecting steel conduit between the tunnels is being placed. The power house structure is practically complete and generating equipment is being installed. The first unit of 42,000-kw. capacity is expected to be in operation in the early part of June 1951 and a second similar unit is expected to be in operation in the early part of August 1951.

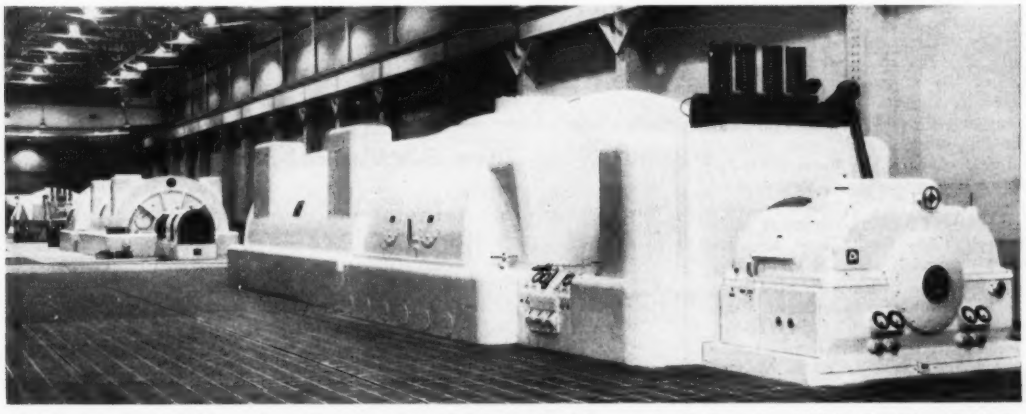
The Mesa to Magunden 220-kv. line, 119.5 miles in length, was completed, placed in service and was carrying load on Oct. 11, 1950. In order to utilize fully the increased capacity of units 10 and 11 at plant No. 3 of the Long Beach steam station, made available as a result of their rebuild for 60-cycle operation, the six boilers in plant 3 were rehabilitated during the year. The continuous steaming capacity of each boiler was increased to 420,000 lb. per hour. Also a seventh boiler is being installed and is scheduled for operation in February 1951. Completion of this work will also enable exportation of steam from the other of 60,000 kva. was installed at Barre substation; and the third, also of 60,000 kva., was placed at Highgrove substation. Also, to provide greater continuity of service, some 220-kv. protection was and is being modernized by replacement with phase comparison-type carrier-current relays.

Construction of a new $34,000,000 outdoor-type steam-electric generating station will begin early in 1951. This station which has been named Etiwanda steam station will be located on a 207-acre plot in the vicinity of Etiwanda. The station will consist of two turbogenerators each with an effective operating capacity of 125,000 kw. Each turbogenerator will be provided with one boiler with throttle steam conditions of 1,800-lb., 1,000°, with 1,000° reheat and boiler steaming capacity of 920,000 lb. per hour. Stone and Webster Engineering Corp. will perform the engineering and construction work on this station. Orders for major equipment have been placed, and the station is scheduled for operation late in 1952.

Negotiations have been in progress for some time looking toward an increase of capacity in the interconnection between the Pacific Gas and Electric Co. and the Southern California Edison Co. at the latter's Magunden substation near Bakersfield. A new 250,000-kva. bank of 220/200-kva. autotransformers has been ordered and the increased interconnection is planned for operation in December 1951. Plans are nearing completion for the installation of a 200,000-kva. 220/138-kv. interconnection between the electric systems of the Department of Water & Power of the city of Los Angeles and Southern California Edison Co. Final plans should be completed and equipment orders placed early in 1951.

Construction of one new 220-kv. transmission substation is scheduled to start in 1951. It will be known as Center substation and will be located near Norwalk. It is programmed for operation early in 1952 with an initial installation of two 90,000-kva., 220/66-kv., transformer banks. Six new distribution substations are also planned for construction in 1951. These, together with additional transformers to be installed at existing transmission and distribution substations, will require approximately 458,-250 kva. of new transformer capacity.

Plans are in progress to construct 904 line miles of transmission and distribution circuits in 1951 and to connect approximately 45,000 new meters. Included with the above line miles of transmission circuits are the 220-kv. lines from Big Creek 4 to Magunden and from Big Creek 3 to Big Creek 4, presently under construction and scheduled for completion by June 1951.—*W. N. Johnson, vice-president in charge of operation.*



Unit No. 3, a new 50,000-kw. unit at Silver Gate steam plant, was placed in operation in September 1950 by San Diego G&E Co.

more efficient boilers of plant 3 for use in plant 2 turbines.

The installation of tie-line load control equipment is in progress at major points of interconnection with other systems. Telemetering indications of interchange loads are transmitted to the dispatching center and the output from generating units is regulated accordingly. Three duplex ultra-high-frequency multipurpose communication channels were placed in operation during the year. This was the first electric utility microwave installation actually placed in service on the West Coast. The channels provide operating paths between Colton substation, which is an attended control station, and two normally unattended stations located at Redlands and Yucaipa, for supervisory control, telemetering, and, for the present, equivalent wire voice circuit.

Three synchronous condensers were added to the system during the year for the combined purposes of system power factor correction and voltage control. One of 40,000 kva. was placed at Springville substation;

Turlock Irrigation District

Last year's construction budget of $250,000 covered five miles of 66-kv. transmission line, twenty miles of 12-kv. distribution line, six replacements of 15-kv. oil circuit breakers and the connection of 900 new customers to the lines.

This year's construction budget of $200,000 is intended to cover substantially the same amount of line additions plus attention to betterments in voltage regulation.—*L. H. Parker, electrical engineer.*

Colorado

Colorado-Big Thompson, USBR

Power from one of the three 15,000-kw. generators at the Estes power plant was made available in September for use on this large transmountain diversion project. The remaining two units of the same capacity were placed on the line in January. The 8,100-kw. Marys Lake power plant is nearing completion. Construction of the 33,250-kw. Pole Hill power plant was started in July. Invitations are to be issued early this year for construction of the 63,000-kw. Flatiron power plant and the 90,000-kva. Flatiron switchyard. The 115-kv. Flatiron-Greeley line was completed in March, and the Flatiron-Longmont-Leyner line of the same voltage was completed in August. The 69-kv. Yuma-Wray and the 115-kv. Pole Hill-Flatiron lines were completed in June.

Installation of the three 6,000-hp. motors of the Granby pumping plant was completed in November. Installation of the 69-kv. transmission cable through the 13-mile-long Alva B. Adams tunnel is virtually completed. The 70-mile, 115-kv. Brush-Limon line was completed in October. Contract for construction of the 115-kv., 72-mile Brighton-Hoyt-Brush transmission line was awarded in November.

Invitations are expected to be issued soon for construction of the following lines: Gore Junction-Muddy Pass, 69 kv., 18.5 miles; Flatiron-Fort Collins-Cheyenne Tap, 115 kv., 36 miles; and Salida-Gunnison, 115 kv., 60 miles.

Colorado Central Power

Again growth in customers and demand for service exceeded the 1950 forecast. By year's end construction requirements were $150,000 greater than the original budget of $500,000. Final figures show 9% customer increase, 14.5% increase in kw. demand and 15.3% increase in kwh. sales. For 1951 our budget is $750,000.

In 1950 a bank of fixed boost transformers was replaced with a 5,000-kva. step voltage regulator in the original feeder line to Golden and the mountain area. The fixed boost bank has been relocated near Littleton to increase voltage on rural lines in that area. Conversion of the Littleton and Golden primary distribution system from delta to wye was half completed. A third of the Englewood primary system was converted. A 2,500-kva. substation was erected in North Englewood and 13.2-kv. feeder lines were rerouted and enlarged to serve the new substation and relieve load on other circuits. Two 10,000-kva. fixed boost transformers were installed to raise voltage in Englewood and Littleton until a new 115,000-volt substation could be built and a new feeder brought in from Denver.

In Platteville the existing 2,500-lumen incandescent street lights on the main thoroughfare were replaced with 20,000-lumen mercury vapor lights. In the Golden business district ornamental street lighting was replaced in two blocks with mercury vapor units to complete the modernization program there. In an area annexed to Englewood, 48 incandescent lights were added. A third 40x120-ft. section was added to the warehouse. This section will be used for the meter department which is to be moved from the Englewood office and for expanded warehouse facilities. Four more mobile radio units have been added making 22 now in service. Sixty miles of distribution circuits have been added. Substation transformer capacity of 2,500 kva. and distribution transformer capacity of 3,000 kva. were installed.

Plans for 1951 call for 35 miles of distribution system and 32.5 miles of transmission lines insulated 46 kv., but currently operated at 13.2 kv. Substation transformer capacity will be increased 3,000 kva. and distribution transformer capacity 2,000 kva. In the Golden district sections of the mountain lines will be rebuilt, extended and increased in capacity. The Pleasantview substation transformer capacity will be increased, a new substation built in Indian Hills and a new station in North Golden presently of 1,000 kva. but with structure and electrical equipment size for 2,500-kva. operation. Distribution system cutover from 2,400 volts delta to 4,160 volts wye in Golden, Englewood and Littleton will be completed.

In the Fort Lupton district a line insulated for 46 kv. now operating at 13.2 kv. will be extended and a 1,500-kva. substation will be relocated nearer load center at Hudson. Lines, along abandoned railroad rights-of-way, to Johnstown and Platteville will be relocated and increased in capacity. In the Arapahoe district in addition to the 32.5 miles of 46-kv. transmission line we expect to convert a rural area east of Englewood from 2,400/4,160 volts wye to 7,620/13,200 volts wye to serve more adequately expected load growth and to tie in with 13.2-kv. system planning. We plan to complete the tie line between Englewood and Littleton substations scheduled for 1950 but not finished. Switching equipment has been ordered for our section of the new 115,000/13.2-kv. Public Service Co. of Colorado substation, our new point of delivery to be located between Englewood and Littleton.

We will continue to replace incandescent street lighting with mercury vapor units on Englewood Broadway and install similar units in newly incorporated Greenwood Village. Several more mobile radio units will be added.—*J. E. Wilson, vice-president.*

Farm Electrification by States

State	Total Farms Jan. 1, 1945	No. Farms Electrified July 1, 1950	Unelectrified Farms July 1, 1950	Per Cent Electrified Farms
Arizona	13,142	11,839	1,303	90.1
California	138,917	136,804	2,113	98.5
Colorado	47,618	43,570	4,048	91.5
Idaho	41,498	41,051	447	98.9
Montana	37,747	27,076	10,671	71.7
Nevada	3,429	2,305	1,124	67.2
New Mexico	29,695	19,435	10,260	65.4
Oregon	63,125	62,809	316	99.5
Utah	26,322	21,485	4,837	81.6
Washington	79,887	78,593	1,294	98.4
Wyoming	13,076	10,176	2,900	77.8
TOTALS	494,456	455,143	39,313	

Colorado Springs PU Dept.

Approximately $600,000 were spent for new facilities in 1950. This completed the final steps of a 10,000-kw. steam plant addition that was put in service the last of 1949, and added to distribution facilities.

Budgeted for 1951 is $800,000 to be used for the preliminary steps in connection with a new North steam plant. The first unit will be a 15,000-kw. preferred standard unit. Further additions to the distribution and subtransmission facilities also are planned.

Plans were formulated last year on a basis of 10% per year growth. In 1950 the load increase was actually over twice that much. This has caused

a stepped up timetable for the expansion program.—*F. H. Wiley, superintendent, electric division.*

Public Service of Colorado

During 1950 Public Service Co. of Colorado spent a total of $19,000,000 for new facilities; electric construction expenditures amounted to $14,000,000 of this total. The proposed construction program for the year 1951 calls for total expenditures of $24,050,000, of which $18,915,000 will be spent for new electric facilities. The board of directors, in approving the 1951 construction budget, authorized a new 60,000-kw. steam generating unit scheduled for operation in 1953.

The first 40,000-kw. unit of the new Arapahoe steam plant was placed in operation in 1950; two additional units of 40,000 kw. each are scheduled for operation in 1951. A 7,500-kw. unit is also scheduled for operation at the Grand Junction plant in 1951.

Additions of 155,000-kva. substation transformer capacity and 36,200-kva. distribution transformer capacity, 79 miles of transmission lines and 285 miles of distribution lines were completed in 1950. The 1951 construction program also calls for the addition of 134,000 kva. of substation transformer capacity, 36,000 kva. of distribution transformer capacity, approximately 54 miles of transmission lines and 200 miles of distribution lines.

The company added 11,600 new electric customers and the peak demand on the system reached 287,100 kw. for the year 1950.

Southern Colorado Power

The amount of new construction in 1950 was $2,230,000. Principal amount was for the installation of a completely new 7,500-kw. steam plant in the city of Rocky Ford, Colo., situated in the southern part of Colorado on the Arkansas River, 54 miles east of Pueblo. This plant was located at Rocky Ford to supplement two 69-kv. transmission lines from Pueblo which serve the entire Arkansas Valley between Pueblo and La Junta, nine miles east of Rocky Ford, and also on the Arkansas River. This plant will be placed in operation about April 1951. Engineering and construction is in charge of Stearns-Roger Mfg. Co. of Denver, Colo.

There were 35 miles of distribution lines completed, 4,500 kva. of substation transformer capacity and 7,500 kva. of distribution transformer capacity added in 1950. Peak load was 39,000 kw.

The amount of the 1951 construction budget is estimated at $1,177,027. Of this amount $574,940 is carry-over from the 1950 budget. One 11,500-kw. generating unit has recently been scheduled for installation at Canon City, Colo., but is not included in the 1951 construction budget.—*M. G. Lord, vice-president in charge of operation.*

REA Operation—Eleven Western States

State	Cumulative Construction Loans	1950 Loan Approvals: Amount	1950 Loan Approvals: Estimated Miles	1950 Loan Approvals: Estimated Consumers	Energized Systems: To Dec. 1, 1950: Miles	To Dec. 1, 1950: Consumers	To Dec. 31, 1949: Miles	To Dec. 31, 1949: Consumers
Arizona	$14,230,906	$ 95,000	23	25	2,427	8,982	1,861	8,007
California	10,722,178	4,885,000	644	12,505	2,369	12,666	2,214	12,407
Colorado	43,851,976	10,066,000	4,833	5,612	16,437	45,368	14,421	40,462
Idaho	12,283,295	3,458,000	806	1,714	5,130	12,373	4,944	11,560
Montana	33,824,697	5,926,000	2,935	2,419	15,869	27,653	13,809	25,386
Nevada	316,000	....	....	....	164	720	164	702
New Mexico	34,146,975	8,453,000	3,493	5,200	8,953	28,212	6,873	22,630
Oregon	25,288,354	4,155,000	830	2,854	6,766	23,195	6,000	20,721
Utah	11,794,500	....	....	....	1,244	3,449	1,222	3,304
Washington	25,986,599	2,416,000	229	974	11,570	28,271	10,367	23,729
Wyoming	17,627,307	2,466,000	1,015	839	7,509	13,813	6,466	11,764
Totals	$230,072,787	$41,920,000	14,808	32,142	78,438	204,702	68,341	180,672

Idaho

Albeni Falls Dam, Army Engineers

Albeni Falls Dam is being constructed by the Seattle District, Corps of Engineers as an important element in the planned multiple-purpose development of the Columbia River and its tributaries. The project will provide 1,140,000 acre-ft. of usable storage in Lake Pend Oreille, Idaho, providing the addition of about 150,000 kw. of prime power to the federal system through the existing and authorized generating facilities on the Columbia River. The project will include installation of three generators which will add another 42,600-kw. capacity to the federal system. Appropriations for fiscal year 1950 totaled $2,900,000 for initial construction. Present plans indicate the dam will be completed and two generators installed and operating by December 1954. The third generator will be in operation by April 1955. Construction of the spillway and the cofferdam for the power house is scheduled for completion in the early spring of 1952. Completion of these works will permit operation of the reservoir for fully effective storage of the 1952 spring runoff.

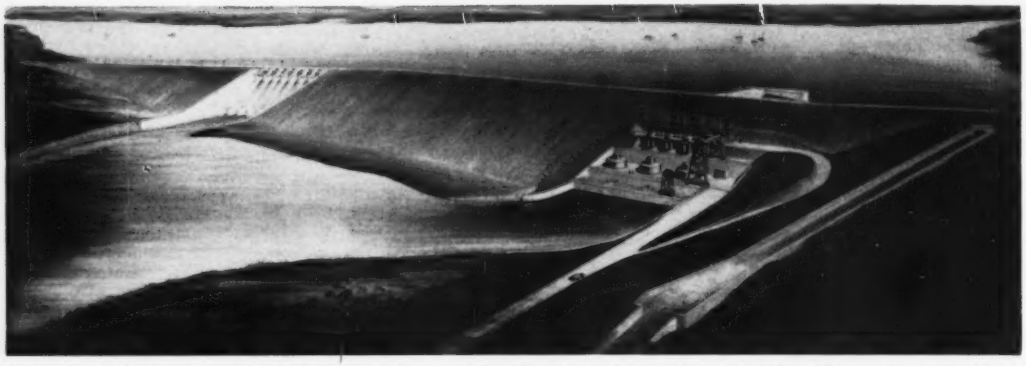
Boise Project, USBR

Construction of the spillway and power plant at Anderson Ranch Dam was completed in October. Power production from the two 13,500-kw. generators was started in November. The 115-kv. Anderson Ranch-Mountain Home transmission line was completed in September.

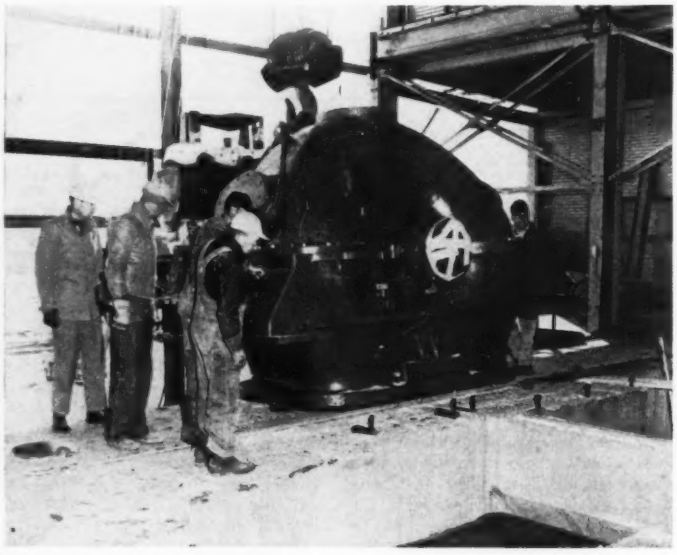
Idaho Power

Providing new and improved service in advance of the constantly increasing demand for service continued to pace Idaho Power Co. activities in 1950. In addition to supplying additional service for the increases in the normal load, the company contracted to serve a third electric phosphate furnace at Pocatello, and the cobalt mining operations near Salmon, Idaho, and jointly with Utah Power & Light Co. contracted to serve the atomic energy reactor testing station near Arco, Idaho.

On Sept. 19, 1950, L. E. Johnson, manager of Idaho Operations Office, United States Atomic Energy Commission, announced a long-term contract with the Idaho Power Co. and the Utah Power & Light Co. to provide power for the reactor testing sta-



J. C. Strike hydroelectric project of Idaho Power Co. on Snake River is due for completion in 1952 with capacity of 82,500 kw.



Turbine for 7,500-kw. unit at Rocky Ford steam plant of Southern Colorado Power Co.

Frank Bird 66,000-kw. steam plant under construction by Montana Power at Billings

tion. The contract provides for all power requirements of the project except such power as originates from the experimental generating facilities within the project. Under the terms of the contract Idaho Power Co. will supply two thirds and Utah Power & Light Co. will supply one third of the power for the project.

The company on May 17, announced the signing of a contract to supply power for a new 18,000-kw. electric furnace, the third unit, of the Westvaco Chemical Division of the Food Machinery & Chemical Corp. at Pocatello. The first such furnace to be installed west of the Mississippi was put into service by Westvaco at Pocatello in 1949, and the second unit early in 1950.

Early in October a 69-kv. line to the Blackbird mining district in the vicinity of Salmon, Idaho, was energized. This line brings service to the cobalt mines of the Calera Mining Co. Because of the importance of this metal at this time, the fact that there are only two known deposits in the United States, it may well be said that this was the most strategic service connection of the year. This line was a part of a project to bring transmission service to both the city of Salmon and the surrounding territory. The line from Bannack, Mont., to Salmon, Idaho, connects with the Montana section of the 161-kv. Anaconda-Grace line jointly owned by the Montana, Utah and Idaho power companies. It is 60 miles long over rugged mountains and across the continental divide. The 69-kv. line from Salmon to the Blackbird mining district is 31 miles long and likewise traverses a rugged mountainous terrain. The longest span in the system is on this line. It is 5,100 ft., lacking only 180 ft. of being exactly a mile.

To meet the requirements of the

increasing load and expanding territory the company's power development program continues. Total construction expenditures for the year 1950 amount to approximately $8,300,000 being the low between two high expenditure years. In 1949 the construction expenditures totaled over $22,500,000 and the 1951 budgeted construction program is estimated at $22,800,000. The highlights of 1950 construction are as follows:

Power Plants

The second and third units of the 75,000-kw. Bliss hydroelectric development on the Snake River were completed early in the year, bringing to a close for a short period of a few months a power plant construction program lasting for a period of nearly five years with a total installed new capacity of 175,000 kw.

In August the company announced plans to build the C. J. Strike hydroelectric generating station on the Snake River about 20 miles southwest of Mountain Home. Advanced permission to proceed with construction was received from the Federal Power Commission on Nov. 8, and active construction on the project was commenced immediately. This will be the largest station on the system, having an installed capacity of 82,500 kw. It will have an earth-fill dam with concrete spillways. The dam and spillways will have an over-all length of approximately 3,000 ft. and an approximate height of 120 ft. Total cost of the project, exclusive of connecting transmission lines, is estimated at $19,373,000.

Transmission Lines

Total transmission line construction during the year consisted of 85 miles of 69-kv. line and 145 miles of 138-kv. line. The 69-kv. lines brought service to the Salmon and Blackbird mining areas, providing service to a larger territory and making it possible to discontinue the use, except for emergencies, of the small hydro station and diesel plant. The 138-kv. lines consisted mainly of a line connecting the Bliss plant with the eastern part of the system.

Several new stations of new and improved design were completed during the year. There were seven substations completely replaced, the largest one being at Ontario, Ore. The new station is 138 kv., 30,000 kw. and is both a transmission tie as well as a distribution substation. There were five substations at new locations having a combined capacity of 37,000 kw. Approximately 500 miles of distribution line were added to the system during the year, this being substantially less than the amount built in 1949. The year 1951 will about bring to a conclusion the new area extension program which involved the extension of service to all outlying districts in the service territory. By the end of this year farms in southern Idaho will be almost 100% electrified.—*B. C. Russell, general superintendent.*

Montana

Fort Peck Project, USBR

Construction on the 115-kv. Havre-Shelby transmission line is essentially completed. Also virtually completed are the substations at Savage, Williston, and Miles City, Mont. The substation at Circle, Mont., was completed in July. Construction of the 30,000-kva. Havre substation is about 85% completed.

Hungry Horse Project, USBR

Construction of Hungry Horse Dam and power plant is nearing the halfway mark. The millionth yard of concrete was placed in the dam in November. Fabrication of the four 71,250-kw. generators for the power plant is on schedule.

Libby Dam, Army Engineers

Libby Dam was authorized by Congress for construction on the Kootenai River near Libby, Mont., under the 1950 Flood Control Act. The project will provide approximately 4,250,000 acre-ft. of usable storage. This will be obtained during the spring flood period and released gradually during winter months to produce substantial quantities of firm power both at site and at downstream plants on the Columbia River. Initial installation will consist of six generating units with a rated capacity of 98,000 kw. each, totaling 588,000 kw. As ultimately developed, the power house at Libby Dam will contain ten generating units totaling 980,000 kw. The reservoir behind the dam will extend into Canada. Considerable progress has been made towards the solution of the international problems involved. Agreement between the Canadian and United States governments may be forthcoming at an early date which will clear the way for appropriations by Congress for planning and construction of the project.

Montana Power

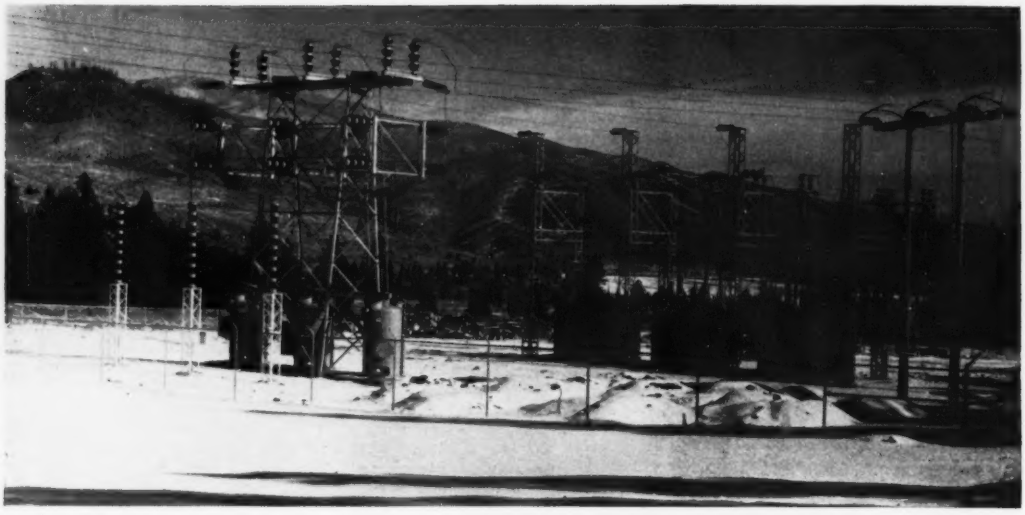
In 1950 the Montana Power Co. commenced construction on a 66,000-kw. Frank Bird steam plant at Billings, Mont. This plant is scheduled to go on the line in August 1951, and will bring the system to 471,000 kw. total. Construction has been started on the 69-kv. line from Billings to Hardin, Mont., which will be completed in 1951. During that year, it is expected that another 69-kv. transmission line will be built down the Bitter Root Valley from Missoula to Hamilton. The program of raising distribution system voltage has been continued. Several local programs increased the substation capacity substantially. Further work of this nature is anticipated in 1951, providing the material situation will allow.

Nevada

Sierra Pacific Power

In 1950 Sierra Pacific Power Co. spent approximately $1,900,000 for new and improved facilities in its electric department. Some specific items included were: 31 miles of H-frame transmission line, designed for future operation at 120 kv., initial operation at 66 kv.; installation of a 45,000-kva. substation (120/60 kv.), completing a third interconnection with PG and E; additional transformer capacity of 3,000 kva. in distribution substation; installation of radial gates in forebay at Washoe hydro plant; improvements in Reno and Sparks distribution systems, including several new 4-kv. feeders. Distribution transformer capacity added was 11,000 kva.

Tentative budget for 1951 construction proposes expenditure of $1,400,000. Of this amount, approximately $200,000 represents replacement of one complete hydro plant diversion dam, and elements of other dams and waterways, destroyed in the November 1950 flood. A new 10,000-kva. substation will be installed to increase supply to the Reno 23-kv. subtransmission loop, and one additional 3,750-kva., 23/4-kv. unit substation in the Reno area. Additional voltage regulator capacity rated at 20,000 kva. will be installed on the 60-kv. bus at Washoe transmission substation. Program of conversion of remaining 2,400-volt rural lines to 12 kv. or 23 kv. will be continued during the year. Appropriations for short line exten-



California substation with 45,000 kva., completed by Sierra Pacific as part of third interconnecting line with Pacific Gas and Electric

sions, transformers and meters are lower than 1950 expenditures, on the basis of probable decrease in rate of new private construction. — *V. D. Armstrong, executive engineer.*

New Mexico

PS of New Mexico

During 1950, approximately $3,000,000 were spent in capital improvements by the four divisions of the Public Service Co. of New Mexico. A total of $4,000,000 has been budgeted for similar purposes in 1951. No new capacity was added during 1950 but construction on an additional 6,000-kw. unit at the Santa Fe plant was started. This unit should go into service in March or April 1951. We have also entered into a contract with the U.S. Bureau of Reclamation under which they will construct a 115-kv. line to Albuquerque and deliver 15,000 kw. of capacity to our system by October 1951. We have placed orders for all equipment for a new 20,000-kw. plant in Albuquerque, construction of which will be started in 1951 and completed in 1952.

Approximately 16 miles of transmission line and about 50 miles of distribution line were added in 1950. We also practically completed the changing of approximately 15 miles of 22-kv. line to 44 kv. This is our last 22-kv. equipment and the job will be completed early in 1951. An additional 7,500-kva. transformer was installed in the transmission substation at our Albuquerque plant and new distribution substation capacity amounting to 15,000 kva. was installed in Albuquerque. About 18,000 kva. were added in distribution transformers. The Albuquerque-Santa Fe system peak increased 9,000 kw. to a total of 51,400 kw. or 21% over 1949. Kilowatt-hours for the entire system increased 16.5%.

Capital expenditures in 1951 will practically all be for extending and reinforcing the distribution systems. It is expected that about six miles of transmission line and between 50 and 60 miles of distribution line and 40,000 kva. in substation capacity will be added. Installation of approximately 20,000 kva. in distribution transformers and about 9,000 meters in 1951 is anticipated. All indications point to a continued increase in both demand and consumption providing material can be obtained.—*E. M. Conwell, electrical engineer.*

Oregon

Bonneville Power Administration

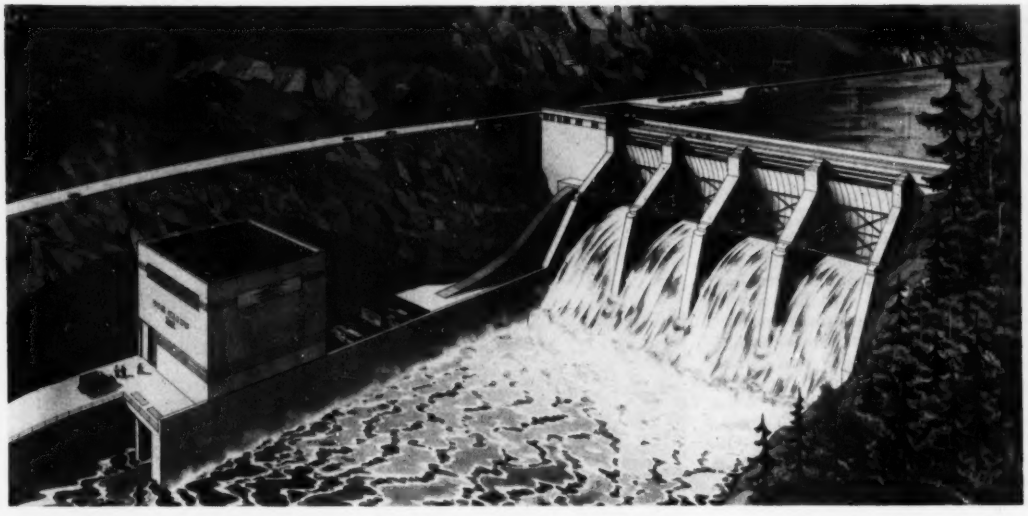
Peak demand on Bonneville and Grand Coulee plants was 2,443,000 kw. on Dec. 8, 1950. A higher peak may occur later in the month. Over 15,000,000,000 kwh. were produced at these two plants during 1950 for distribution over Bonneville Power Administration's transmission system to 105 customers. Revenues from the sale of this power amounted to $33 million. Increases over the 1949 calendar year were: peak demand 17%, generation for Bonneville Power Administration 13%, number of customers 4% and revenue 14%.

Expenditures for new and improved facilities during 1950 amounted to $33,300,000. Approval of the present budget before Congress, including actual funds available, will increase that figure to an estimated $48,000,000 in 1951. The increase is largely due to an expanded transmission line program to keep pace with the schedule of additional generating plant installations.

Peak generating capacity was increased by 360,000 kw. installed at Grand Coulee Dam during the year. Scheduled additions for 1951 include three additional units at Grand Coulee, bringing the total to 18 by the end of the year.

Transmission system additions during 1950 included 209 miles of 230-kv. and 223 miles of 115-kv. line, and 502,500 kva. of transformer capacity. Plans for 1951 call for 407 miles of 230-kv. and 131 miles of 115-kv. line, with added transformer capacity of 866,000 kva.

Short-term contracts (one year) have been executed with the five major private utilities in the western part of the region for delivery of 325,000 to 560,000 kw. on an interruptible basis during the 12-month period ending Sept. 30, 1951. Companies included are: Pacific Power & Light Co., Washington Water Power Co., Portland General Electric Co., Puget



Big Cliff Dam and power house under construction by Army Engineers on North Santiam River, Ore. Capacity will be 18,000 kw.

Sound Power & Light Co., and the Mountain States Power Co. A five-year contract was entered into with the Montana Power Co. for 25,000 kw. of firm power when the first generator unit at Hungry Horse Dam is energized, until July 1, 1953, when 50,000 kw. of firm power will be delivered for duration of the contract.

Peak requirements of approximately 6,689,000 kw. will need to be met by the federal system in 1958, according to the most recent estimates of the Bonneville Power Administration. This represents more than double the current load. In order to provide for reserves and the replacement of steam-electric generation in addition to firm power requirements, total federal installations in the Pacific Northwest region of about seven million kilowatts are planned for installation by January 1959.

McNary Dam, Army Engineers

McNary Dam was about 30% complete at the end of the first six months of fiscal year 1951. The contract covering the navigation lock, abutment embankment, fishways, and appurtenant structures on the north (Washington) shore, which was let to McNary Dam Contractors of Plymouth, Wash., on July 30, 1948 (first month of fiscal year 1949) on their bid of $21,850,000, is now, at the halfway mark of fiscal year 1951, 99.45% complete.

Contract for the Oregon shore cofferdams, embankment abutment, excavation and construction of substructure for two units of the 1,422-ft. long power house that will generate eventually 980,000 kw. was let on Aug. 5, 1949 (second month of fiscal year 1950). McNary Dam Contractors won that contract also on their bid offer of $15,835,539.50. This contract is now about 67% complete.

Fiscal year 1951 appropriation for McNary Dam was $37,720,900.

A highly interesting feature of this contract was the closure of the 240-ft. gap in the upper wing of the main cofferdam. This gap was at the main 60-ft. deep channel of the Columbia, near the Oregon shore. Closure operations began Oct. 10, 1950, and were accomplished with 2,088 12-ton concrete tetrahedrons and 27,000 tons of B rock, deposited in the gap in alternate layers. "Tets" broke surface on Dec. 16, 1950, and waters of the Columbia were dammed off and diverted across toward the Washington shore and through 13½ completed spillway bays and the navigation lock. This lock was opened to river transportation at 8:00 a.m. Dec. 18. Contractor has set the cost of complete cofferdam closure at $980,000.

Power is expected from the first two units by early December 1953.

Mountain States Power

Continued good service to its customers prompted a construction expenditure of approximately $4,200,000 by Mountain States Power Co. during 1950. Major items included 9 miles of 66-kv. transmission line to provide an alternate source of power for the Corvallis, Ore., area; installation of remote-control switching equipment in the transmission substation at Springfield, Ore.; further expansion of the $250,000, 50,000-kva. substation at Albany, Ore., as well as other specific projects in the company's five divisions in Oregon, Idaho, Wyoming and Montana. During 1950 approximately 3,000 new customers were connected to bring the total served to approximately 104,000. Agricultural areas continued to show interest in the use of electric power for irrigation and during the past year the company's load was increased by several thousand horsepower for such purposes. Present inquiries indicate that an even greater increase in irrigation customers may be expected in the next few years.

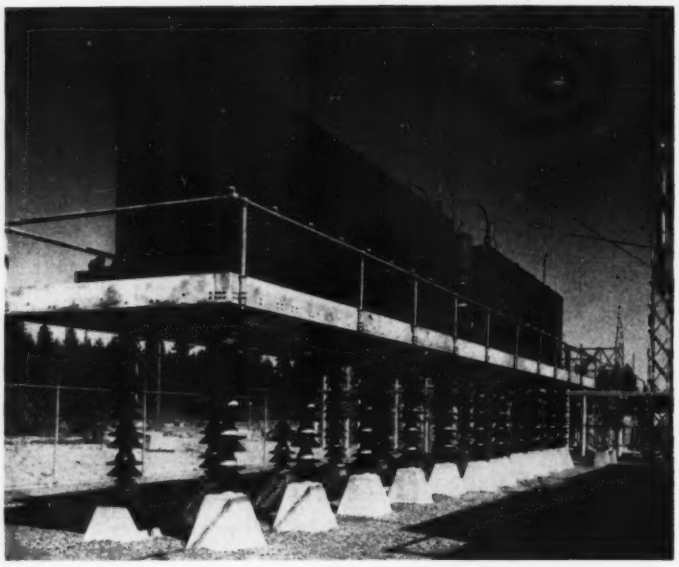
A 400% increase in peak load in the past ten years indicates the extent of the development in the Willamette Valley, Ore. Other areas served have developed to a somewhat similar degree. Other utility services furnished by the company have also increased greatly during the past few years. To keep up with this growth, Mountain States Power Co. has budgeted construction expenditures totaling $4,250,000 for the year 1951. Of this amount approximately $400,000 will be expended for transmission lines; nearly $500,000 has been allocated for substation additions and improvements; approximately $2,500,000 for additions and improvements to the distribution system and for miscellaneous equipment; while the balance of $850,000 will be invested in

property additions to supply other forms of utility service. Included in this last item is the installation of dial telephone exchanges to replace the present manually operated system in Montana.

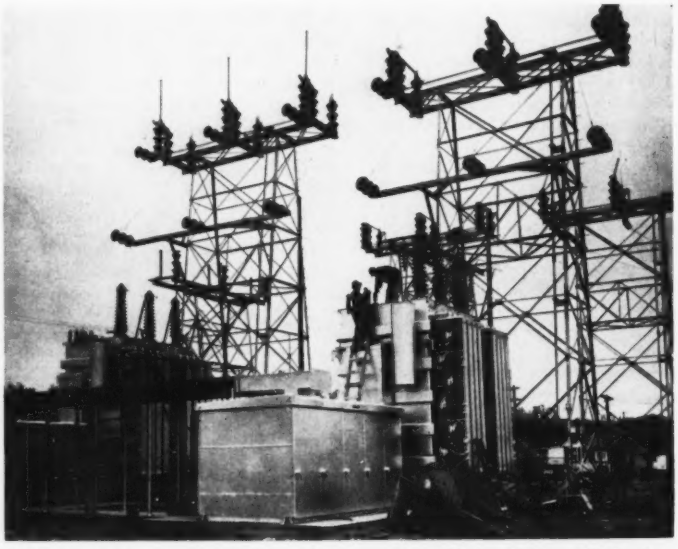
Pacific Power & Light

During the year 1950 Pacific Power & Light Co. spent more than $5,700,000 on system additions and improvements. This was distributed generally throughout the system and did not involve any particularly large project. In the Yakima, Wash., area, the 110-kv. loop, started in 1949, was continued with the construction of approximately four miles of 110-kv. transmission and an additional 15,000-kva., 110/12-kv. substation. Included in this program was a continuation of work started in 1949 to convert the Yakima distribution system from 2.4 kv. to 12 kv. Another point of interconnection was established with the Bonneville Power Administration at Grandview, Wash., consisting of a 110-kv. switching station, approximately four miles of a 110-kv. transmission line, and a 20,000-kva., 110/66/12-kv. substation. This will strengthen service in the lower Yakima Valley area formerly supplied from a 66-kv. loop.

The 1951 construction program provides for approximately the same amount of improvements and additions as were made in 1950. Conversion of Portland area distribution from 2.4 to 4 kv., started in 1949, will be continued with substation additions to provide for anticipated load growth. The continuation of the Yakima 110-kv. loop is planned with the installation of a 22,500-kva., 110/12-kv. substation. Other planned work consists of additional substation facilities and conversions to higher distribution voltages made necessary by increased loads.—*J. Coleman Jones, general superintendent.*



15,000-kva. series capacitor bank installed by the Bonneville Power Administration at Centralia, Wash., for series compensation on Ross-Olympia 230-kv. transmission line



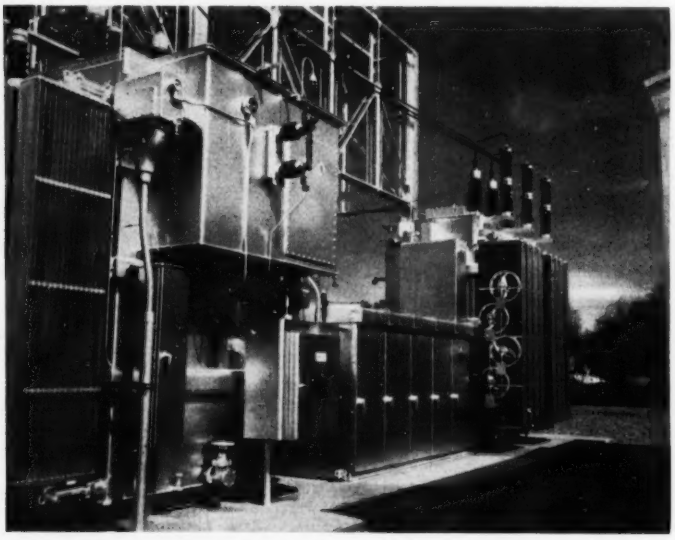
15,000-kva. Pacific Power & Light substation on the 110-kv. Yakima, Wash., loop

Portland District, Army Engineers

Other than Bonneville Dam on the Columbia River, the Portland District, Corps of Engineers, has two projects embracing power development now under construction. Detroit Dam is under construction on the North Santiam River about 49 miles southeast of Salem, Ore., and Lookout Point Dam is being constructed on the Middle Fork Willamette River about 23 miles southeast of Eugene, Ore. A flood control project, Detroit provides for construction of a main dam and reregulating dam, both with power generating facilities. Detroit Dam will consist of a concrete-gravity structure 1,523.5 ft. long with a maximum height of 450 ft.; a gate-controlled spillway; and a two-unit power house with a total generating capacity of 100,000 kw.

A concrete-gravity type reregulating dam about 172 ft. in height and a one-unit power house with an installed capacity of 18,000 kw. will be located about three miles downstream at the Big Cliff site. Detroit Dam will create a reservoir about 8.5 miles long providing 340,000 acre-ft. of usable storage for flood control, navigation, irrigation, power and other multiple-purpose uses. Facilities for public use of the reservoir area will be provided.

Recent aerial view of McNary Dam. Progress on construction of power house is shown in left foreground. Two 70,000-kw. units of eleven are scheduled for December 1953



McClain substation, one of several major stations built by Portland General Electric

A salmon hatchery and an egg collecting station will be included in the project. Fish facilities will be operated by the Oregon Fish Commission. Highway relocation work was started in May 1947, and construction of Detroit Dam was initiated in March 1949. Both Detroit and Big Cliff dams are scheduled for completion during 1953. Estimated total cost of the Detroit project based on 1950 price index is $69,797,000. It is calculated the dam will prevent average annual damages totaling $1,126,700. The project is designed to prevent damages totaling $1,123,500 caused by a flood of that magnitude. Total average annual benefits of the project are $3,673,300.

Lookout Point Dam, being constructed under authority of the Flood Control Acts of 1938 and 1950, will consist of an earth and gravel-fill-type dam with a concrete gravity, gate-controlled spillway and a three-unit power house with total installed generating capacity of 115,000 kw. The dam will have a maximum height from foundation to crest of 270 ft. and the spillway will be located in the river channel near the right abutment. Gate controlled outlet conduits will pass through the spillway section. The project also will include facilities for public use of the reservoir area and for propagation of existing runs of salmon. All hatchery facilities will be operated by the Oregon Fish Commission. Lookout Point Dam will create a reservoir about 14 miles long providing 368,000 acre-ft. of usable storage for flood control, power, navigation, and other conservation uses. Generation of power will be contingent on completion of Dexter reregulating dam and Hills Creek Dam, both authorized by the Flood Control Act of 1950.

Because of its strategic location at the head of the Willamette Valley, and the magnitude of uncontrolled flows on the Middle Fork, Lookout Point Dam is one of the key projects in the Willamette Basin flood control program. Railroad relocation work was started in May 1947, and construction of the dam was initiated in July 1949. Completion of the project is scheduled in 1954. Cost of Lookout Point Dam is estimated at $84,411,000 with power installed and using an overflow spillway. It is estimated the dam will prevent average annual damages of $2,502,700. The project itself is designed to prevent average damages totaling $7,981,100 caused by a flood of that magnitude. Total average annual benefits are estimated at $4,427,000.

Portland General Electric

The company's 1951 construction program calls for an expenditure of $8,500,000. This compares with a construction expenditure of $7,200,000 during 1950. The 1950 peak exceeded the 1949 by 9.2% and the 1950 kwh. load was 8.9% greater than for 1949. It is believed that the December 1950 peak would have been materially higher if the weather during December had not been warmer than usual.

The $8,500,000 expenditure for 1951 includes an additional generator of 5,000-kw. capacity for the River Mill hydro plant and for strengthening the company's interconnection with BPA. A third 57-kv. circuit of

795-MCM ACSR capacity will be built from BPA's 230/57-kv. installation at Troutdale substation to the company's Columbia substation. Interconnection capacity will be further strengthened by the 75/125-mva. 150/57-kv. autotransformer which BPA is installing at its Oregon City substation and by the 57-kv. associated transmission capacity which the company is building between BPA's Oregon City substation and the company's West Linn and Salem load centers.

The 1951 construction program also includes $330,000 for carrying out the first step in a comprehensive automatic control and supervisory control program. The distribution program for 1951 provides for additional substation step-down capacity from 57/4.16 kv. and 57/12.5 kv. and for reinforcement of the 4.16-kv. and 12.5-kv. distribution system. — *John Bankus, chief engineer.*

Utah

Telluride Power

Expenditure of $250,000 was made in 1950 for new construction. Major items consisted of building 20 miles of 44-kv. transmission line and reconductoring another 35 miles; building 25 pole miles of distribution line; increasing substation capacity by 2,750 kva. and distribution transformer capacity by 1,000 kva. System peak load increased 15% over 1949.

The 1951 budget contemplates an expenditure of about $150,000, covering 25 miles of distribution line, 500 kva. in distribution transformers, 700 kva. in substation capacity, a 15,000-kva. regulating and boosting transformer for interchange with a neighboring utility, and construction of about ten miles of 44-kv. transmission line. — *Paul P. Ashworth, general manager.*

Utah Power & Light

Another milestone in Utah Power & Light Co.'s far-sighted expansion program was reached in April 1950 with the completion of the new 40/44-mw. turbogenerating addition at the recently renamed Hale plant. The former Orem plant, at the mouth of Provo Canyon, was rechristened the Hale plant in honor of J. A. Hale, vice-president in charge of engineering, construction and power production, and a pioneer of the power industry in Utah. The new unit, costing $7,400,000, went on the line May 22 for preliminary tests and began regular operation July 6. Pulverized Utah coal is burned and the combined plant output of 62,000 kw. considerably firms up the system's capability in that part of the state.

Work on Salt Lake No. 1 is progressing rapidly and the new 66,000-kw. unit is expected on the line by August 1951. This is a 1,250-psi, 950° F steam unit burning a residual fuel oil by-product of a nearby oil refinery. The fuel is supplied by a four-mile heated pipe line with heated storage facilities being utilized at both ends. Eventual cost of the new installation will be about $10,500,000.

Power house area for 18,000-kw. Slide Creek hydro plant of California Oregon Power

As an extension of Salt Lake plant, construction of the Salt Lake No. 2 unit already has begun, with completion scheduled for October 1952. The boiler will feature a reheat cycle with 1,450-psi steam pressure at 1,000° F temperature. This is expected to increase the over-all efficiency of the unit by about 7%, and boost the expected output from 65,000 kw. to 75,000 kw. at unity power factor. The No. 2 unit is designed to burn residual fuel oil, coal or gas.

Work on a new diversion dam at Grace hydroelectric plant was completed last summer at a cost of $480,000. Utilizing the old site as a coffer dam, the new dam spans Bear River for 180 ft. and reaches a height of 58.3 ft. measured from the river bed. It is of rock-filled, timber-cribbed construction with a concrete spillway. The reservoir will completely submerge the old dam. Six thousand feet of the Grace flow line were replaced at a cost of $400,000. The replaced section is 11 ft. in diameter; constructed of creosoted staves and resting on steel ring-type saddles.

Construction on a new operations center and warehouse located just north of the Salt Lake steam plant is going ahead rapidly. A concrete block and steel general warehouse costing $160,000 with equipment was finished and brought into service in April 1950. This building encompasses 27,000 sq. ft. of storage space and will serve as a general material depot, receiving and breaking up carload lots for reshipment over the entire system. The $850,000 air-conditioned operations center office building is now under construction and is scheduled for occupancy sometime in the spring of 1951. The new structure of steel and concrete construction with brick facing will provide about 40,000 sq. ft. of office space, including a lunch room for employees. A new service building at American Fork was completed and occupied early in 1951. The $140,000 brick structure houses the entire engineering, metering, stores and service departments for the American Fork division.

Transmission line extensions and substation capacity increases costing nearly $1,000,000 were completed in 1950. Transmission substation capacity was increased by 107,000 kva.; additions being 45,000 kva. at Hale plant, 25,000 kva. at Riverdale near Ogden, 25,000 kva. at Terminal west of Salt Lake City and 12,000 kva. at Montpelier, Idaho. Transmission line

extensions totaled 24.3 miles of 130,000-volt line; chief among which was an extension from Oneida hydroelectric plant to Montpelier, Idaho, and 47.2 miles of 44,000-volt line. Thus, the total construction of high-voltage transmission lines was 71.5 miles during the year. Placement of high-speed oil circuit breakers at important switching points was continued and an accelerated program is anticipated for 1951.

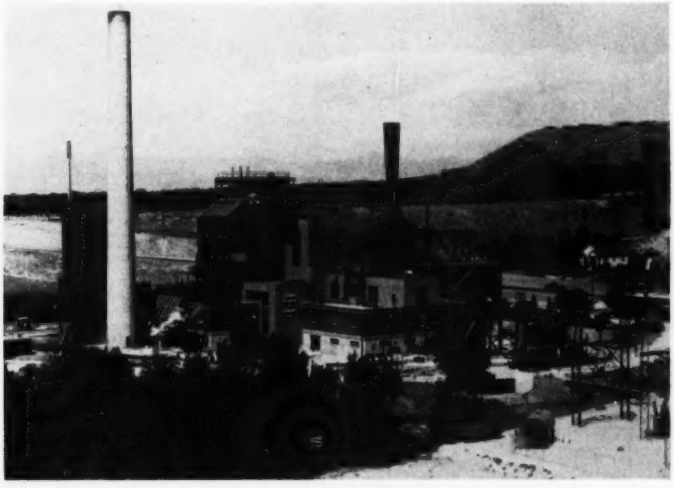
To meet increasing defense demands, negotiations involving Utah Power & Light Co., Idaho Power Co. and the Atomic Energy Commission were recently completed which resulted in Utah Power & Light Co. starting construction on a 45-mile, 132-kv. line from Goshen, Idaho, to the government's reactor testing station near Arco, Idaho. The line itself will be of wood pole, H-frame construction. A 44-kv., 30.8-mile line is also being built to the Army's proving ground near Dugway, Utah. Scheduled completion of both these lines will be early in 1951.

Distribution extensions and substation capacity additions amounting to over $3,000,000 were carried out in 1950. A company program extending over several years of rural line extension has very nearly reached the saturation point over the entire system. The installation of additional distribution substation capacity was stepped up to meet ever growing demands. The chief addition was in the Salt Lake area where substation capacity increased from 114,000 kva. to 133,000 kva., an increase of 19,000 kva. Total cost of this expansion was $450,000 which included one completely new substation.

Major construction news for 1951 will be the completion in August of the first unit of the new Salt Lake steam electric plant. A 66,000-kw. unit, first of an eventual three, will be put on the line at a cost of about $10,500,000. Work on the $11,000,000 Salt Lake No. 2 unit will continue, with an additional $3,000,000 being spent during 1951. Final completion is set for October of 1952. This additional power near the load center of the system and in a highly industrialized area will considerably strengthen the system and reduce transmission line losses. Many loads of great importance to the defense effort are in the company's territory.

The company will continue its transmission line extension program as service needs indicate. The Helper-Columbia 44-kv. line will be completed at a total cost of $200,000. This additional line was necessary to carry a growing load and insure service reliability in the Sunnyside-Columbia-Horse Canyon coal mining areas. The completed line will also pass near Price City, with the possibility of duplicate service when required. The 132-kv. line from Goshen into the government's reactor testing station near Arco, Idaho, will be completed with a total expenditure of $725,000 which will include a substation of 20,000 kva.; switching and metering installations. A total of $177,000 will be spent to complete the 37-mile, 44-kv. line from Tooele into the Army's chemical warfare proving grounds near Dugway. The power supply to Cache Valley, Utah, will be greatly improved with $275,000 being spent to complete installation of additional transformer capacity of 20,000 kva. at the Cutler hydroelectric station, Utah; construction of 44-kv. switchracks in the vicinity of Smithfield, Utah, and the completion of 20 miles of 44-kv. line between Cutler and Smithfield.

Besides substation capacity increases at Goshen and Cutler, the company plans to increase substation capacity another 40,000 kva. because of load increases in various areas. These additions will be 20,000 kva. at the Hale plant and 20,000 kva. at Helper, Utah. Distribution substation capacities will be increased throughout the system with two new 44-kv. substations planned for construction in the rapidly expanding Rose Park residential area west of Salt Lake and at Grace, Idaho. Additional large expenditures will be made for distribution feeders, transformers, capacitors and services. Residential service to 7,500 new customers is anticipated.



Utah Power & Light's Hale plant adds 44 mw. of 185 mw. to be installed by end of '52

Washington

Chief Joseph Dam, Army Engineers

Chief Joseph Dam is being constructed by the Seattle District, Corps of Engineers, primarily for the generation of hydroelectric power. As ultimately developed, the power house will contain 27 generating units. The turbines will have a capacity of about 100,000 hp. each at the rated head of 165 ft. Generators will have a rating of 64,000 kw. each, a total for 27 units of 1,728,000 kw., the second largest hydroelectric power plant in the world exceeded only by Grand Coulee. Appropriations for fiscal year 1949 and 1950 totaled $7½ million for construction. Fiscal year 1951 appropriations totaled $18,529,000. Present plans indicate the dam will be completed and the first four generating units will go on the line in 1955.

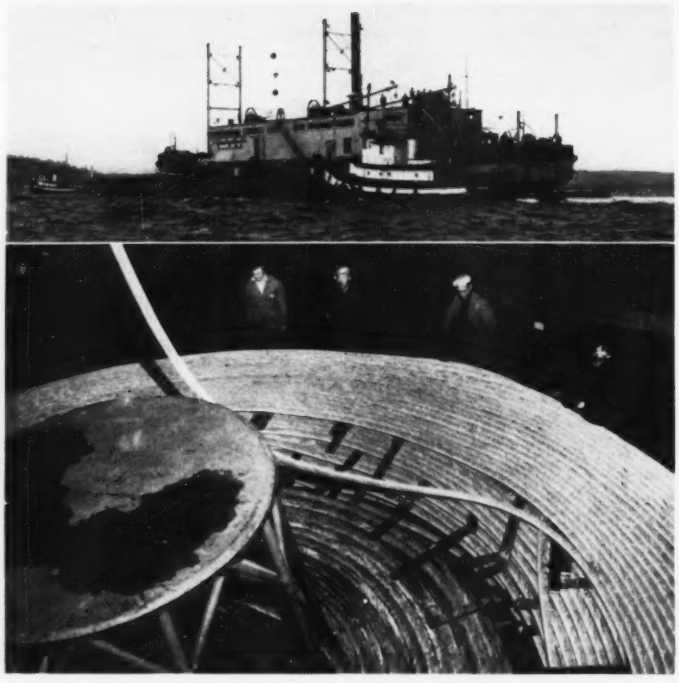
Clark County PUD

Clark County Public Utility District's construction program in 1950 was highlighted by repairs to damage caused by the ice storm in January that leveled 1,129 poles and interrupted electric service to 25,000 of the county's 28,000 customers. In ef-

fect, the storm hastened by three to five years the necessity for rebuilding large portions of the system. In 1950 nearly 2,000 poles were set in addition to those toppled by the storm. This is the largest number of pole replacements in a single year in the history of electric service in the county and represents 10% of all poles in the system.

Continuing a program begun in 1948 when the county-wide system was acquired from Pacific Power & Light Co., 30 miles of distribution line were converted from 2,400 to 7,200 volts wye. Sixty miles of line were rebuilt, and ten miles of line extensions were built. Customers at the end of the year set a new record —28,600.

In 1951 the utility will continue the program of improvements initiated in 1948. Budgeted is $290,000 for further line conversions, rebuilds and general improvements. For tools and equipment, including more short-wave stations and additional motor vehicles, $30,000 has been set aside. The budget for meters and transformers and single pole replacements calls for $180,000. The utility purchased a hole digger in 1950 which proved to be a time and money saver. —*V. M. Cleaveland, manager.*



Cable ship and cable well used in laying Puget Power 15-kv. cable to Vashon Island

Columbia Basin Project, USBR

Installation of the three 108,000-kw. generating units R-4, R-5, and R-6 in the right power house at Grand Coulee Dam was completed in October. Completion of installation of the remaining three units of the same capacity, R-7, R-8 and R-9, in the right power house, currently in progress, will represent the development of Grand Coulee plant's capacity to the full 2,300,000 kw. Installation of the remaining 10,000-kw. station-service unit in the left power house is virtually completed.

Construction on the Grand Coulee pumping plant structure is nearing completion. Assembly of two of the six 65,000-hp. motors began in November. The remaining four motors which are to drive the 1,350-cfs pumps are currently being manufactured and are scheduled for installation in June. Present plans indicate that operation of the first two pumps will begin in May.

Cowlitz County PUD

During 1950 we completed the conversion of the 2.4-kv. distribution system between Castle Rock and Kelso to 7.2/12.45-kv. operation. This included complete rebuilding of this portion of the system, replacing approximately 90% of the distribution poles and all of the distribution transformers and much of the conductors. We completed a new 13.2-kv., 6-circuit switching station at our Columbia Way substation with all 1,200-amp., 1,000,000-kva., 15-kv. oil circuit breakers. This project also included the construction of three heavy 13.2-kv. feeders out of the Columbia Way substation into the city of Longview. The construction of approximately 12 miles of 69-kv. transmission line from Woodland to Kalama River substation also was initiated. The first four miles was completed during 1950 and is now operating at 12.45 kv. These major improvements were of course supplemented by an extensive program of pole replacement and distribution reconstruction in all parts of the county, including the completion of the integration of four major independent distribution systems.

During 1950 we plan on continuing our extensive program of pole replacement and general distribution system reconstruction. We also plan on completing the 12 miles of 69-kv. transmission line between Kalama River and Woodland with the installation of three 69/7.2-12.45 substations of 3,750-kva., 2,000- and 1,000-kva. capacity. We also plan on the completion of a 69-kv. transmission line between the BPA Longview substation and the West Kelso substation, approximately five miles in length with the completion of a 69-kv. switching station and the installation of a 3,750-kva., 69/7.2-12.45-kv. step-down substation. Also the major part of the 2.4-kv. distribution system will be converted to 2.4/4.16-kv. wye in the cities of Longview and Kelso.

Steam Plant Improvement

Major improvements at the steam generating plant will be mechanical fuel handling equipment and the installation of a spare boiler feed pump. We also hope to install air coolers on at least one additional generator. A modern district office building located in Kelso, Wash. (whose total cost including furnishings will be approximately $60,000) will be completed. This building is approximately two-thirds completed. A quonset-hut-type garage and repair shop is also planned during 1951.—*O. G. Hittle, manager.*

Raising prepared dead-end on new 32-mile Nisqually 110-kv. line of Tacoma City Light

Puget Sound Power & Light

During 1950 five new distribution substations, with 15,000 kva. in transformer capacity, were constructed; the transformer capacity in five substations was increased 12,500 kva., and a new 30,000-kva. bank was added to one switching station, while the capacity of one station was decreased 5,000 kva., making net additions during 1950 of 52,500 kva.; 11,370 rkva. in static capacitors were added in 1950, and one 16,500-ft., 3-conductor 1/0—15-kv. submarine cable was installed between the mainland and Vashon Island. Of $5,200,000 spent on plant accounts during 1950 $3,835,000 was for distribution, $800,000 for transmission. The balance was for hydro and steam stations and other miscellaneous accounts.

During 1951 we expect to build five new substations with a total capacity of 11,400 kva., and to increase the capacity of five substations by 13,750 kva. in transformers. Of the $5,000,000 budgeted for the plant accounts during 1951, $3,660,000 will be for distribution, $600,000 for transmission and the balance for the generating stations and other miscellaneous accounts.—*Frank McLaughlin, president.*

Seattle City Light

For the year 1950, total expenditures for plant amounted to approximately $11,206,000, of which about $6,000,000 were expended on transmission lines and the distribution system and $5,206,000 on construction of the power house at Ross Dam, repairs to Diablo Dam and improvements in Gorge power house preparatory to the installation of a 60,000-kw. hydro unit* in 1951. A total of 45 miles of 26-kv. transmission line was built, and 124,000 kva. in substation transformers were installed. Deliveries of equipment were satisfactory with minor exceptions.

The number of electric meters increased to 137,200 over 131,881 in 1949, or about 4.03% increase. The net system energy in 1950 increased 9.7% over the 1949 output. The 1950 peak demand was 312,000 kw. as compared to 278,000 kw. for 1949, an increase of 12.2%. These increases are attributed to the general increased business and industrial activity in the Seattle area. Annual system load factor for 1950 was 49.4% as contrasted with 50.6% for 1949.

* This unit will deliver approximately 40,000 kw. at the present head of 294 ft.

1951 Plans

Present plans for expansion of the department's facilities during 1951 include the building of 45 miles of 26-kv., 43.8 miles of 115-kv. and 81.5 miles of double-circuit 230-kv. transmission lines, and 45 miles of 4.3-kv. distribution circuits; the installation of some 269,000 kva. of transformers, including 75,000 kva. in unit-type substation, two 90,000-kva. banks of receiving substation transformers, and 44,000 kva. in distribution transformers; completion of the installation of a 60,000-kw. hydro unit at Gorge power house with three 25,000-kva., 230-kv. transformers; installation of three 31,000-kva., 230-kv. transformers replacing 165-kv. transformers for three present generators; continued construction of the Ross power house; repairs and betterments to Diablo Dam. This will involve the expenditure of an estimated $18,400,000, divided into $6,000,000 for hydro generation, $7,950,000 for the transmission facilities, and $4,450,000 for distribution and other purposes.

The work outlined is part of an eight-year program initiated in 1947 for adding to and improving the service facilities of Seattle City Light, which is estimated to involve some $50,000,000. In this program are included, in addition to the items listed above, the completion in 1950 of a concrete diversion dam to replace an old wooden crib dam, with an increase in head of 8 ft. for Gorge power house, the construction of Ross power house below Ross Dam, and the ordering of equipment for installation in Ross power house of three 90,000-kw. hydro units, with the necessary transmission and distribution facilities to bring the additional energy to consumers.—*E. R. Hoffman, superintendent of lighting.*

Tacoma City Light

The Cowlitz River power development has held the focus of attention throughout the year culminating in November in a hearing before the Federal Power Commission with whom jurisdiction for development lies. It is anticipated that conflicting differences between state authorities, the federal authorities and the city of Tacoma arising chiefly from opposition of the sports and commercial fishing interests will be resolved through this federal agency. The geo-

logical investigations, the preliminary engineering and the studies relating to the financial aspects of this $142,000,000, 460,000-kw. hydro development have been completed.

A report of operations as of Oct. 31, 1950 shows the increase over last year to be astounding. Although the total number of billings have increased by only 5% the kilowatt-hour use is up 15.53%. The number of industrial billings has decreased by 2.55%, however, the energy consumed has increased by 18%. Other usage has increased over last year as follows: residential 13.2%, commercial 7.57%, municipal 15.57% and sales for resale 14.93%.

Peaking requirements for the 1949-50 season reached 232,000 kw. in January 1950 and on November 14

Calendar of New Generation

(1949 installations have been dropped and 1956 added)

1950—Completed

Date	Size	Plant	Agency
Jan.	11,500 kw. (S)	Steam plant	Eugene Water Bd.
Jan.	12,500 kw. (H)	Leeburg	Eugene Water Bd.
Jan.	50,000 kw. (H)	Bliss	Idaho Power
Jan.	42,500 kw. (H)	Toketee	Calif. Ore. Power
Jan.	37,500 kw. (H)	Cresta	PG and E
Jan.	100,000 kw. (S)	Kern	PG and E
March	126,000 kw. (H)	Rock Creek	PG and E
April	25,000 kw. (H)	Keswick	USBR
April	100,000 kw. (H)	Grand Coulee	USBR
April	100,000 kw. (S)	Moss Landing	PG and E
June	12,000 kw. (H)	Kortes	USBR
July	44,000 kw. (S)	Hale	Utah P & L
July	108,000 kw. (H)	Grand Coulee	USBR
Aug.	12,000 kw. (H)	Kortes	USBR
Aug.	10,000 kw. (H)	Drop 4	Imperial Irrigation Dist.
Sept.	15,000 kw. (H)	Estes	USBR
Sept.	50,000 kw. (S)	Silver Gate	San Diego G & E
Oct.	108,000 kw. (H)	Grand Coulee	USBR
Oct.	40,000 kw. (S)	Waian	Hawaiian Elec.
Oct.	35,000 kw. (H)	Ruskin	B.C. Elec.
Nov.	15,000 kw. (H)	Estes	USBR
Nov.	13,500 kw. (H)	Anderson Ranch	USBR
Dec.	13,500 kw. (H)	Anderson Ranch	USBR
Dec.	15,000 kw. (H)	Estes	USBR
Dec.	10,000 kw. (H)	Grand Coulee	USBR
Dec.	450 kw. (H)	Alturas	Calif. Ore. Power
Dec.	100,000 kw. (S)	Moss Landing	PG and E
Total	1,206,450		

1951—Planned

Date	Size	Plant	Agency
Jan.	45,000 kw. (H)	Davis Dam	USBR
Jan.	12,000 kw. (H)	Kortes	USBR
Jan.	8,100 kw. (H)	Mary's Lake	USBR
Jan.	37,500 kw. (H)	Owens Gorge	L.A. Dept. of W&P
Jan.	100,000 kw. (S)	Moss Landing	PG and E
Feb.	45,000 kw. (H)	Davis Dam	USBR
Mar.	6,000 kw. (S)	Santa Fe	Pub. Ser. of N.M.
Mar.	37,500 kw. (H)	Owens Gorge	L.A. Dept. of W&P
Spring	100,000 kw. (S)	Contra Costa	PG and E
Spring	100,000 kw. (S)	Contra Costa	PG and E
Spring	100,000 kw. (S)	Contra Costa	PG and E
Spring	60,000 kw. (H)	Gorge	Seattle City Light
April	40,000 kw. (S)	Arapahoe	Pub. Ser. of Colo.
April	18,000 kw. (H)	Slide Creek	Calif. Ore. Power
April	108,000 kw. (H)	Grand Coulee	USBR
April	45,000 kw. (H)	Davis Dam	USBR
May	45,000 kw. (H)	Davis Dam	USBR
May	37,500 kw. (H)	Owens Gorge	L.A. Dept. of W&P
June	45,000 kw. (H)	Davis Dam	USBR
June	11,000 kw. (H)	Soda Springs	Calif. Ore. Power
Summer	84,000 kw. (H)	Big Creek 4	So. Calif. Ed.
July	108,000 kw. (S)	Grand Coulee	USBR
July	1,200 kw. (H)	Angostura	USBR
Aug.	66,000 kw. (S)	Salt Lake No. 1	Utah P & L
Aug.	66,000 kw. (S)	Frank Bird	Montana Power
Oct.	100,000 kw. (H)	Grand Coulee	USBR
Oct.	82,500 kw. (H)	Hoover Dam	USBR
Oct.	50,000 kw. (H)	Lake Buntzen	B.C. Elec.
Oct.	11,000 kw. (H)	Fish Creek	Calif. Ore. Power
Fall	27,500 kw. (H)	C. J. Strike	Idaho Power
Nov.	7,500 kw. (S)	Grand Junction	Pub. Ser. of Colo.
Nov.	40,000 kw. (S)	Arapahoe	Pub. Ser. of Colo.
Dec.	27,000 kw. (H)	Cushman No. 2	Tacoma City Light
Dec.	5,000 kw. (H)	Station M	Portland Gen. Elec.
Total	1,676,300		

1952—Planned

Date	Size	Plant	Agency
Jan.	50,000 kw. (H)	Hoover Dam	USBR
Jan.	82,500 kw. (H)	Hoover Dam	USBR
Jan.	55,000 kw. (H)	C. J. Strike	Idaho Power
Spring	30,000 kw. (S)	El Centro	Imperial Irrigation Dist.
April	15,000 kw. (H)	Boysen	USBR
Summer	18,300 kw. (H)		Arizona Pwr. Authority
Summer	30,000 kw. (S)	Burbank	Burbank P.S. Dept.
Autumn	100,000 kw. (S)	Moss Landing	PG and E
Autumn	100,000 kw. (S)	Moss Landing	PG and E
Fall	20,000 kw. (S)	Glendale	Glendale P.S. Dept.
Fall	60,000 kw. (S)	Highgrove	Calif. Elec. Power
Fall	10,000 kw. (H)	Drop 2	Imperial Irrigation Dist.
Oct.	75,000 kw. (S)	Salt Lake No. 2	Utah P. & L.
Oct.	15,000 kw. (S)	North St.	Colo. Springs Dept. P.U.
Oct.	50,000 kw. (S)	Silver Gate	San Diego G. & E.
Oct.	15,000 kw. (H)		
Oct.	60,000 kw. (H)		
Oct	71,250 kw. (H)		
Nov.	150,000 kw. (H)		
Nov.	20,000 kw. (S)		
Dec.	20,000 kw. (H)		
Dec.	71,250 kw. (H)		
Winter	250,000 kw. (S)		
Total	1,368,300		

1953—Planned

Date	Size	Plant	Agency
	6,000 kw. (S)	Telluride	Telluride Pwr.
Spring	33,000 kw. (H)	Salt Springs	PG and E
Spring	100,000 kw. (S)	Contra Costa	PG and E
May	33,250 kw. (H)	Pole Hill	USBR
May	31,500 kw. (H)	Flatiron	USBR
May	31,500 kw. (H)	Flatiron	USBR
June	50,000 kw. (H)	Detroit	Army Eng.
Aug.	270,000 kw. (H)	Ross	Seattle City Light
Aug.	71,250 kw. (H)	Hungry Horse	USBR
Autumn	100,000 kw. (S)	Contra Costa	PG and E
Nov.	71,250 kw. (H)	Hungry Horse	USBR
Nov.	50,000 kw. (H)	Canyon Ferry	USBR
Nov.	100,000 kw. (S)	not named	L.A. Dept. of W&P
Dec.	50,000 kw. (H)	Detroit	Army Eng.
Dec.	18,000 kw. (H)	Big Cliff	Army Eng.
Dec.	140,000 kw. (H)	McNary	Army Eng.
Dec.	30,000 kw. (H)	Lemola No. 1	Calif. Ore. Power
Dec.	30,000 kw. (H)	Lemola No. 2	Calif. Ore. Power
Dec.	60,000 kw. (S)	Denver	Pub. Ser. of Colo.
Total	1,275,750		

1954—Planned

Date	Size	Plant	Agency
Early	40,000 kw. (S)	Pasadena	Pasadena L&P Dept.
April	100,000 kw. (S)	not named	L.A. Dept. of W&P
April	70,000 kw. (H)	McNary	Army Eng.
June	36,000 kw. (H)	Alcova	USBR
Mid Year	40,000 kw. (S)	Highgrove	Calif. Elec. Power
July	53,333 kw. (H)	Folsom	USBR
July	5,000 kw. (H)	Nimbus	USBR
Aug.	70,000 kw. (H)	McNary	Army Eng.
Aug.	14,200 kw. (H)	Albeni Falls	Army Eng.
Oct.	30,000 kw. (H)	Ekulutna (Alaska)	USBR
Oct.	15,000 kw. (S)	North St.	Colo. Springs Dept. PU
Dec.	84,000 kw. (H)	Lookout Point	Army Eng.
Dec.	70,000 kw. (H)	McNary	Army Eng.
Total	627,533		

1955—Planned

Date	Size	Plant	Agency
Feb.	14,200 kw. (H)	Albeni Falls	Army Eng.
April	70,000 kw. (H)	McNary	Army Eng.
June	15,000 kw. (H)	Dexter	Army Eng.
Aug.	14,200 kw. (H)	Albeni Falls	Army Eng.
Aug.	53,333 kw. (H)	Folsom	USBR
Aug.	70,000 kw. (H)	McNary	Army Eng.
Oct.	53,333 kw. (H)	Folsom	USBR
Fall	60,000 kw. (S)	Honolulu	Hawaiian Elec.
Dec.	70,000 kw. (H)	McNary	Army Eng.
Dec.	65,000 kw. (H)	Ice Harbor	Army Eng.
Dec.	65,000 kw. (H)	Ice Harbor	Army Eng.
Total	550,066		

1956—Planned

Date	Size	Plant	Agency
April	65,000 kw. (H)	Ice Harbor	Army Eng.
April	70,000 kw. (H)	McNary	Army Eng.
	40,000 kw. (S)	Pasadena	Pasadena L&P Dept.
Aug.	70,000 kw. (H)	McNary	Army Eng.
Aug.	65,000 kw. (H)	Ice Harbor	Army Eng.
Sept.	25,000 kw. (H)	Cougar	Army Eng.
Sept.	15,000 kw. (H)	White Bridge	Army Eng.
Sept.	81,000 kw. (H)	Green Peter	Army Eng.
Dec.	70,000 kw. (H)	McNary	Army Eng.
Dec.	64,000 kw. (H)	Chief Joseph	Army Eng.
Dec.	64,000 kw. (H)	Chief Joseph	Army Eng.
Dec.	64,000 kw. (H)	Chief Joseph	Army Eng.
Dec.	64,000 kw. (H)	Chief Joseph	Army Eng.
Dec.	20,000 kw. (H)	Hills Creek	Army Eng.
Total	777,000		

this year a peak of 251,000 kw. closely approached the December estimate of 258,000 kw. The 1950-51 seasonal peak is expected in January with a maximum of 275,000 kw. anticipated.

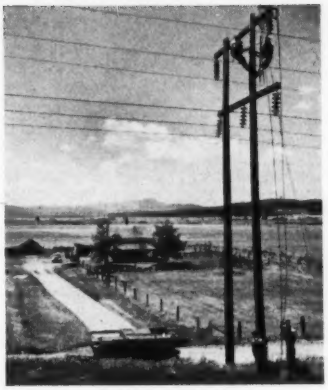
The expenditure in plant accounts for 1950 amounted to $3,218,731, of which $60,000 went into steam plant improvements, $140,524 into hydro plant improvements, $1,387,826 into transmission plant, $1,441,512 into distribution plant and $188,869 for miscellaneous improvements. Corresponding plant expenditure estimated for 1951 provides $47,895 for steam plant improvement, $1,930,392 for hydro plants, $2,860,693 for transmission, $2,195,027 for distribution and $380,500 miscellaneous. The installation of a third 27,000-kw. generating unit at Cushman Plant No. 2 is a major project scheduled for the year, also the installation of 74,000 kva. of substation transformer capacity and the erection of approximately 5 miles of 110,000-volt and 12 miles of 13,000-volt transmission lines.—*J. Frank Ward, superintendent, light division.*

Washington Water Power

In 1950 the Washington Water Power Co. carried out a $4,500,000 construction program to increase and improve its facilities in Washington and Idaho. It is estimated $3,400,000 will be used for similar purposes in 1951. An additional $9 to $10 million will be devoted to preliminary phases of construction of a new 200,000-kw. hydroelectric generating plant at Cabinet Gorge on the Clark Fork River in Bonner County, Idaho, following granting of a permit by the Federal Power Commission on Jan. 10, 1951.

During the year WWP increased its substation transformer capacity 45,000 kva. and added 40,000 kva. in distribution transformer capacity. Eight new substations were built and another five modified to increase their capacity. Among the new stations was a major installation in Spokane. Operating at 110/13 kv., it taps one of the company's Long Lake-Spokane transmission lines near the city limits to help serve a large new residential section. Another major 110/60-kv. station was constructed near Colville, Wash., to improve operating conditions and provide additional capacity in that area. The station ties in with the Bonneville Power Administration's 110-kv. Spokane-Metaline line.

Largest single item of construction was the building of 53 miles of new 110-kv. line between Spokane and Colfax, Wash. It relieves other heavily loaded transmission lines into the southern section of WWP territory and allows increased drafts of power to cities in that area. The new line called for terminal equipment in Sunset substation, just west of Spokane, and for new oil circuit breakers and switchgear in its southern terminus at Colfax.



Hotstick crew reinsulates WWP 110-kv. line

Forty-one miles of 60-kv. line from Post Falls, Idaho, to Newport, Wash., were reinsulated for 110 kv. Most of the work was done hot. As part of the project, a new substation was built at Spirit Lake, Idaho, and another at Newport, where power is furnished to 60-kv. connections of the Mountain States company, the Pend Oreille PUD and the Pend Oreille REA. The line will wheel power for BPA's Newport-Bonners Ferry (Idaho) line, still to be completed from Sandpoint to Bonners Ferry.

During the year also, 134 miles of new distribution lines, including 70 miles of rural lines, were added. Some 300 blocks of 4-kv. distribution system in Spokane were rebuilt to 13-kv. operation and another 100 blocks in the Clarkston-Lewiston area. Six additional vaults were installed in the Spokane underground system.

Apart from the electric system, a new fuel-fired boiler was installed at the company's steam heating plant in Spokane. Capable of producing 80,000 lb. of steam an hour, it increased the plant's capacity 20%, and brought to 12 the number of fuel-fed boilers in the plant. Work was started on the building of a new filtration plant and storage reservoir for the Clarkston water system. It is expected the project to provide the city of Clarkston with filtered water will be completed early in 1951.

System improvements in 1951 will call for the addition of 28,600 kva. of substation transformer capacity. Largest new station to be built will be a 110/13-kv. installation in Spokane. It will add 12,000 kva. to the city network. Three other new stations, one 110/13 kv. and two 60/13 kv., will be built, and the capacity of four existing stations increased.

Installation of high-speed relaying equipment on all 110-kv. transmission lines will be completed during the year. Generator voltage regulators will be improved at the Little Falls and Nine Mile plants. Regulators to improve service or provide increased regulator capacity will be installed in 13 substations, including five in the Spokane area.

Another 500 blocks in Spokane and 100 additional in the Lewiston-Clarkston area will be rebuilt from 4- to 13-kv. operation. Additional cables and substation equipment will be put into service in the Spokane underground system to carry out a project to divide the system in two parts. Distribution transformer capacity will be augmented 50,000 kva., and 160 miles of distribution lines, including 90 miles of rural lines, will be constructed.

If the company is allowed to proceed on its plans to build a dam and power plant at Cabinet Gorge, 34 miles of 110-kv. line will be built for construction purposes, and initial phases of the dam building project started. The company still awaits decision by the FPC on its application to build the 200,000-kw. plant at Cabinet Gorge. The project would cost upwards of $40,000,000. It was initiated in direct response to the necessities occasioned by the critical power shortage in the Northwest, and is a development that can quickly produce a sizable power supply. If the federal agency puts an early stamp of approval on the project, its initial output of 150,000 kw. could be available by November 1952, nearly a year ahead of other major projects in the area.

The site is within a half mile of the Idaho-Montana state line, about eight miles east of Clark Fork and a short distance from Pend Oreille Lake. The dam would rise 160 ft. from the river bed, and water would be fed through 540-ft. tunnels to operate 70,500-hp. turbines driving semioutdoor-type vertical generators. Plans call for a 230,000-volt transmission line to shuttle Cabinet Gorge power into Spokane connections of WWP and the Northwest Power Pool. The project would be the twelfth power plant to be operated by the

WWP, and would increase its total generating capacity to more than 400,000 kw.—*J. E. E. Royer, vice-president and general manager.*

Wyoming

Missouri River Basin Project, USBR

A significant development in 1950 was the start of generation at Kortes power plant in Wyoming, the first unit of this vast project to produce power. The first of the three 12,000-kw. generators was placed in operation last June and was followed by the second unit in August. The third generator is scheduled for operation in January. By December 1950, construction of Kortes Dam and power plant was about 96% complete.

Three other power plants are currently under construction on the project—Boysen in Wyoming, housing two 7,500-kw. units; Angostura in South Dakota, containing one 1,200-kw. unit, and Canyon Ferry in Montana, to furnish power from three 16,667-kw. units. Boysen power plant is about 80% complete, Canyon Ferry is about 30%. Construction of Angostura power plant began last September.

Specifications were issued in November for an important 520-mile transmission loop in southeastern South Dakota. The loop, scheduled for start of construction next spring, comprises a series of 115-kv. lines, 300 miles in length, extending in a southern arc between Huron, Armour, Fort Randall, Gavins Point, Sioux Falls, and Brookings, and a 220-mile-long link which completes the loop and includes lines of the same voltage running between Huron, Groton, Watertown and Brookings.

Transmission lines begun in 1950 and currently under construction in North Dakota include: the 115-kv. Voltaire-Rugby-Devils Lake-Carrington-Jamestown line, about 65% completed; the 69-kv. Leeds-Rolla line, about 35% completed, and the 115-kv. Garrison-Voltaire, Devils Lake-Lakota, and Jamestown-Valley City lines, about 10% completed. The 600-mile loop system, in central North Dakota, comprising these lines, is to be completed under the contracts awarded last July for construction of the loop's remaining segments, the 98-mile, 230-kv. Bismarck-Dawson-Jamestown line, and the 65-mile Garrison-Bismarck 230-kv. transmission line. The 115-kv. Jamestown-Edgeley line was recently completed.

Concrete diversion dam replaces crib structure for Gorge plant, Seattle City Light

In other areas of the project, construction is proceeding on the following 115-kv. lines: Boysen-Thermopolis and Alcova-Boysen in Wyoming; Alliance-Chadron in Nebraska; Sidney-Ogallala in Nebraska, and Seminoe-Sinclair in Wyoming.

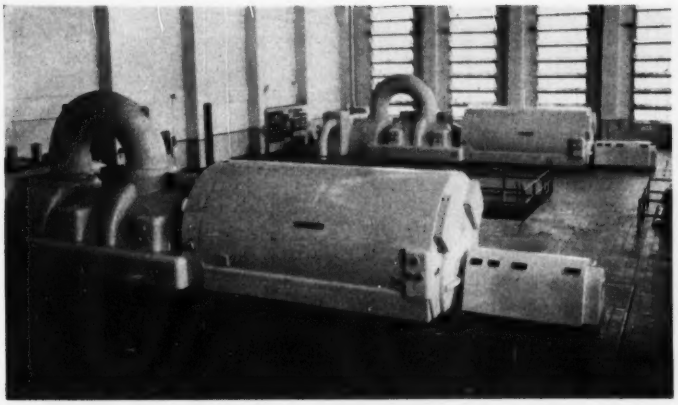
Invitations have recently been issued for the following 115-kv. transmission lines: Thermopolis-Lovell, 115-kv., 84 miles; Garland-Lovell, 115-kv., 19 miles, and Julesburg Tap-Julesburg, 115-kv., 7 miles. Bids are to be asked early this year for construction of the following lines: Garrison-Fort Peck tie, 115-kv., 4 miles; Rapid City-Wasta, Wasta-Midland, Fort Randall-Winner, 115-kv., 184 miles; Bismarck-De Vaul, 69-kv., 42 miles; Pine Bluffs-Kimball, 34.5-kv., 24 miles. Bids for construction of the following transmission lines are expected to be invited this spring: Oahe-Mobridge, 230-kv., 96 miles; Bismarck - Mobridge, 230-kv., 119 miles; Fort Randall-Oahe, 230-kv., 145 miles.

Canada

B. C. Electric

The major construction program of B. C. Electric Co. was continued during 1950 with approximately $15,000,000 being spent on electric service facilities. In the Lower Mainland system a 47,000-hp. unit was added to the generating facilities when the third unit at the Ruskin plant on the Stave River was put in operation on Oct. 25. Work was started on this unit in 1949 and involved the extension of the existing power house, and the construction of a new penstock tunnel and tunnel intake. 1950 also saw the completion of the initial stage of the Bridge River development as the storage dam at LaJoie Falls was completed up to the height necessary for year-round operation of the three 62,000-hp. units. At the Lake Buntzen No. 1 plant on the North Arm of Burrard Inlet work was started on replacing the seven old units, which have a total rating of 28,140 hp., with one new unit rated at 70,000 hp. The existing dam, intake structure, and portions of the penstocks will be used and the power house will be remodeled to contain the new unit. It is expected that this job will be completed in October 1951.

System load growth continued at a high rate during 1950. During December 1950 the peak hourly load was 305,200 kw. compared with 279,000 kw. in 1949. In addition to these loads, we are continuing to export 30,000 kw. under contract to member companies of the Northwest Power Pool in Washington and Oregon. Substation facilities have been expanded by additions to existing stations and by construction of new stations. A major job which commenced in 1950 was the construction of the new Sperling substation. This station will be one of the major stations in the 60-kv. subtransmission ring around the metropolitan area of Vancouver. As well as providing for load growth, it will replace the old Point Grey substation which was served at 34 kv. This 60,-kv. ring has been extended eastward this year by the addition of North Road substation. At the present, this station is served from one of the Stave Falls lines, but it will be expanded in 1951 to become the receiving station for the power from the reconstructed Lake Buntzen No. 1 Plant. At the re-



Waiau generating station of Hawaiian Electric where 40-mw. unit 4 was added in 1950

constructed Horne-Payne substation a 7,500-kva. 12/4-kv. transformer was installed to provide the first 4-kv. distribution out of this station.

The transformer capacity was increased at Murrin substation by the addition of the fourth and final 25,000-kva. transformer. A second 7,500-kva. transformer bank was installed at Royal substation to reinforce the supply to the city of New Westminster. In the Fraser Valley area, the substation capacity was increased in three substations—Surrey, Scott and Vedder—by the addition of a second 3,000-kva. transformer with associated switching and regulating equipment. All the valley substations will shortly be fed at 60 kv. over two lines from Ruskin. One of these lines from Ruskin to a point near Langley, a distance of approximately 8.5 miles was constructed this year and approximately 100 miles of former 34-kv. line were converted to 60-kv. operation.

During the year the small electric systems at Lytton, Yale and Harrison Hot Springs were purchased. Harrison Hot Springs will be served from the company's main system, but small diesel units are being installed for service at Lytton and Yale. In addition, a third diesel unit is being installed to serve the small communities of Boston Bar and North Bend in the Fraser Canyon.

To supply power for transportation services four 1,500-kw. automatic rectifier units were put into service at Murrin to replace the manually operated synchronous converter units in the old Main Street substation. In the West Point Grey area, work is in progress on a new rectifier station which will have an initial capacity of 1,500 kw.

On Vancouver Island the company constructed a new double-circuit 132-kv. line connecting the company's system on the lower end of the island with the system of the B. C. Power Commission at Nanaimo. This 65-mile line was put in service in October, together with Glyn substation, which is the receiving station in the Victoria area and provides for the supply of 17,500 kw. of firm power to the Greater Victoria area from the commission's Campbell River plant, supplementing the company's generating facilities in the Victoria area.

1951 Plans

For 1951 present plans call for an expenditure of approximately $20,000,000. Major items in this budget which have already been referred to include the reconstruction of the Lake Buntzen No. 1 plant and the continuation of the construction of Sperling and North Road substations. In addition, a start will be made on a new hydro development at Jones Lake, approximately 70 miles east of Vancouver in the Fraser Valley. This development will consist of one 82,000-hp. unit and is scheduled for completion in October 1952. In the Greater Vancouver area, an additional 15/20-mva. transformer will be installed at Kidd substation and a similar unit at Burnaby. At Horne-Payne, a second 7.5/10-mva. transformer will go into service and on the North Shore of Burrard Inlet a new station consisting initially of a 6,000-kva. 60/4-kv. transformer will be constructed. To provide the primary supply for this new station, approximately 4.5 miles of 60-kv. overhead line will be built. To reinforce the 60-kv. subtransmission ring, a second overhead line will be constructed between Burnaby and Kidd substations. In the Fraser Valley, one new station will be built with two 3,000-kva. transformers and at one existing station the capacity will be increased by the addition of a third 3,000-kva. transformer.

For transportation power supply, a new station with one 1,500-kw. automatic rectifier unit will be constructed in the eastern part of the city. Rectifier capacity of 3,000 kw. will be installed in an existing station replacing rotating equipment. On Vancouver Island, the capacity of the interconnection with the B. C. Power Commission will be increased by the installation of the second 15/20-mva. transformer at Glyn substation. Other jobs of a more minor nature are planned for this system in 1951 with a view to providing improved service. —*T. Ingledow, vice-president and chief engineer.*

Hawaii

Hawaiian Electric

During 1950 $4,500,000 were spent for new facilities by the Hawaiian Electric Co. Ltd. Budgeted for 1951 is $2,000,000. Waiau Unit No. 4, a 40,000-kw. addition to the generating capacity of the company, was completed and put into operation in October 1950. This consisted of a 447,000-lb./hr. boiler, a 40,000-kw., 3,600-r.p.m. 850-psig., 900°-F.T.T. tandem compound, condensing turbine, a 50,000-kva. 80% pf. hydrogen cooled generator, a 42,000/56,000-kva., 11/44-kv. transformer bank and necessary auxiliaries.

One new 3,000/3,916-kva., 44/11-kv., 3-phase tap changing under load transformer was installed. Two 1,500/1,875-kva., two 2,000-kva., one 3,000/3,916-kva., and one 3,750-kva., 44/4-kv. unit-type substations were installed. Four of these stations were the first half of future duplex-type substations. A 4,500/6,000-kva., 11/4-kv. unit-type substation and a 750-kva. substation were also installed. The major addition to the transmission system was a No. 4/0, 44-kv. line from Waiau generating station to the Koolau substation, a distance of 11.8 miles.

Plans for 1951 consist of installing six unit-type substations. Two of these will be the second half of duplex-type stations that were installed in 1950. Changes will be made to the fuel oil handling facilities at both generating stations so that heavier fuel oil can be used.—*L. A. Buese, vice-president and executive engineer.*

EMEA of Southern California

BUSINESS AS UNUSUAL WILL BE

Let us deal with the present production capacity of the electrical industry, the capacity it has to devote to war work and some of the problems it faces. Also conjecture on what may happen to our individual kinds of business.

In World War I we built, almost side by side, war materials and domestic goods, letting them compete in price for plant capacity, and still played a successful part in winning the war.

In World War II we invoked price control by law, devoted almost our entire industrial plant capacity to war goods and let our domestic plants go to pot.

We now face a war period far different from either of the past two conflicts. For one thing we can see neither the beginning nor the ending time of the decisive part of this struggle. We are perhaps looking at a full generation devoted to a war economy. We face a prolonged period of preparedness and training during which the decisions made will be forced rather than planned.

As we bring our war muscle power up, we must have high morale in our task force of workers. We must have strong individual workers and healthy cooperation between workers, employers and government. We must have a strong, healthy, highly productive internal economy to pay the wages necessary for labor, health and peace and to pay the taxes necessary to finance expanded military needs.

Twin Job Ahead

Our generation faces now the task of superimposing a tremendous preparedness effort upon our domestic economy with a minimum of shock and upset. While facing minimum of security abroad, we must have a maximum of security at home. Not knowing when the decisive struggle will begin or how long it will endure, places a responsibility upon us to keep both war and domestic production at a high level and to keep all plants in good repair and all processes up to date.

The present over-all plan is to expand total plant capacity, including mines, to meet this situation. It is estimated that space and tools must expand by a minimum of 20% and at least 5 million more workers must be added to the peak employed force of 66 million. In addition, some increase in work hours will take place and every possible labor-saving improvement must be made.

We must, of course, do this even though it means bringing less efficient workers into the labor force. The big threat of inflation must be met with unusual productivity, bond drives, increased taxes, plus legal safeguards—and yet these very safeguards are confusing and hazardous.

Complete Change of Pace

We see from all this that the future will not be business as usual, but constant change until change may eventually become the normal condition. Hazards to individuals and business will come suddenly and bring conditions that must be met immediately.

All decisions will of necessity have

We Asked the Experts for Radar Bearings

Usually a review of the past year's accomplishments can be taken as means to forecast with reasonable expectancy what the sales and business outlook for the new year will be. On that basis, by projecting the trends along probable lines, new goals are set for achievement. If that could be done with the 1950 figures all indicators would point toward equally high marks for 1951.

But in these mobilization times such projections are futile. In the regimentation that mobilization requires the goals are set not by natural trends but by fitting them into gaps left in what is needed for the bigger job. Not goals, but limits, are set, and by the government agencies, not the enterprises for their individual businesses.

To give the dealers, contractors, distributors, manufacturers of the West and those who supply the Western market the best idea of what they can expect, Electrical West has asked for well qualified opinions.

For the over-all outlook, a keen analyst of marketing, Kenneth Hampton, manager, Valley Electrical Supply Co., Fresno, was asked for his well-considered views. They are offered here as a realistic guide to the situation for all in the selling end of the electrical industry. Not only is he a practical merchandiser and distributor of electrical merchandise and equipment but during the last war he was called to Washington to serve in a top capacity in the Office of Price Administration and so understands both Washington and the problems facing the present Office of Defense Mobilization.

Following his over-all review, the sales executives of the utilities of the West were asked their opinions and have given them thoughtfully. Because their jobs call for constant analysis of business conditions and possibilities in their own areas the better to serve and be ready to serve the demands the future may make on them, the views of these men are very significant to any dealer or contractor operating in their territories.

Figures used in the tables on the following pages were first asked for by Electrical Merchandising in October 1950, for that magazine's January statistical number. Electrical West followed with a request to all Western utilities to bring the figures up to date for the entire year, and in many cases the figures will be found to be different in minor degrees. Other figures sent in are obviously estimates but they can be said to be "educated guesses" and within reasonable degrees of accuracy.

For a market, the 1950 figures could easily be equalled in 1951 if the opportunity was permitted to sell in a free market. The manufacturer may be sure that everything that is allocated to this market can be sold.

1951's PATTERN

Kenneth Hampton

to be made on the basis of furthering the common welfare of the nation rather than personal self interest.

The transition to war production has, and of necessity, must start very slowly or the disruptions will create problems that eventually will hamper the effort more than it is helped by the change.

Let's examine the effect of the aluminum conservation order just issued and then greatly altered before it was placed in effect.

As issued, this order, it was estimated, would cause approximately 43,000 employees to be idled in one electrical manufacturing company and its sub-suppliers in January 1951. When examined, it was found that no expansions of military use orders could employ these workers for months. The purpose of the order was to create a stockpile of aluminum for future use in war goods. This order was changed to permit a less immediate cut in the use of aluminum and then to make monthly cuts as industry adapted itself to the lessened requirements. As a result, the electrical industry hopes to employ substitute material and make manufacturing adjustments fast enough to avoid substantial upset in employment.

An order was issued prohibiting the use of cobalt by industry. When, upon examination, it was shown that this would have prevented all enameling work on electric ranges, etc., the order was changed to permit the industry to adapt itself to the restrictive requirements. So, rather than shut down this whole industry in January and February while it changed to other processes, it will keep producing while changing to the use of other materials that will enable it to free the cobalt being used.

To give you another example of the upsetting effect of hastily drawn orders, let me quote from the November publication of the electrical contracting industry — "The original M-4 order of the National Production Authority forbidding amusement construction contained a clause stating that in the future any type of construction might be halted at any stage of the building. This, of course, dried up construction credit overnight. It was changed when the industry united in the Construction Mobilization Committee, carried the complaint to Administrator W. H. Harrison."

Ill advised moves could easily bring about tremendous unemployment. To keep our economy healthy, all changes should be analyzed carefully and no unnecessary unemployment created. The generally accepted figure now is that the transition to defense work will idle 2,000,000 workers for about three months early in 1951. There is a danger, of course, that some of the effective work force will be lost because of this.

Better Than Last Time

The production situation so far as trained manpower, plants and manufacturing tools are concerned is much, much better than when the United States began preparing for World War II. Probably the best example of this is the radio branch of the electrical industry.

Equivalent plant and manpower to 1941 are still in use for radio receivers and transmitters, but to this has been added 25% more capacity devoted to the manufacturing of FM radio and 100% more capacity devoted to radar and television.

The skills and processes of this entire radio operation when devoted to war materials is very similar to those devoted to peace-time production. The electrical industry at present is working on the following war material:

Aeroplane jet motors
Superchargers for aeroplanes
Submarine torpedo motors
Wiring construction materials
Communication and detective devices such as small and large radio transmitting shortwave receivers and radar
Aviation electrically heated suits
Insulating materials
Refrigeration and cooking equipment, etc.
Amplidyn motors, etc.

The defense plan, if time permits, is to expand the plants, tools and workers now devoted to this work rather than set up this work in present facilities devoted to other work. In some cases, the expanded work will take whole groups of plants. This may happen in radio and communication and severely impinge on civilian production. In other phases, as in wiring materials, the plants will produce the requirements without much strain.

During the immediately preceding war, the electrical industry built:

Bullets
Bazooka guns
Generators
Search lights and flood lights
Special motors
Marine engines
Night seeing devices
Range finders
Electronic controls
Flying suits
Lights of all kinds
Communication devices of all kinds
Sound detectors and amplifiers, etc.

From this list you can see that many of these products require training of workers as well as new tools and equipment, since the necessary skills are not usually those required by the electrical industry.

Wholesalers Become Assemblers

In addition to the production by regular manufacturing facilities, a very interesting development in the use of wholesalers plants and organization took place during the 1940s and undoubtedly will be greatly expanded when needed. The military gave these organizations orders that required the simple assembly of products widely gathered from small manufacturers. Items such as hand tools were gathered and packed into kits at these plants; other items such as first aid kits, etc., were also assembled.

Thus, as civilian curtailments free these facilities, they will go to war work and add millions of feet of plant capacity but relatively few workers.

An example of the increased ability to produce is in the automobile industry. It is setting what may be an all-time record this year by exceeding last year's record production by an estimated 1¾ million automobiles (1949 production: 6,238,000 cars and trucks, 1,000,000 over 1948—1950 estimate: 7,988,000). This is approximately double the prewar production rate.

The number of automobiles in good repair now in use is approaching the prewar level, so some of the capacity in this industry can go to war tools, but still much more plant must be built.

In 1950 the appliance branch of the electrical industry produced and delivered to customers 50% more appliances than it did in 1949. It is believed that production for civilian use at the 1949 level will keep the domestic economy healthy. This is the basis now being used by the industry in planning 1951 production. However, every indication is that domestic production will fall below this level during the last six months of 1951.

Lest what has been said be construed as an indictment of government planners, let me point out that the weapons of war are so changed that practically all designs of present weapons must be changed and new weapons must be designed.

For this reason, only orders for test models of most items are being placed with industry now. Orders for quantity production are not expected to be placed much before mid-1951.

Private and public investments in plants for the electrical industry have been heavy since the close of the war in 1946. One company, for instance, has invested $600 million in additional plant capacity that is now in full production. Almost all other producers of products for the electrical industry have made proportionate expansions.

More Power to Work With

Great as these expansions are, they are small when compared to the investments that have been made to expand the electric utility's facilities.

C. E. Wilson, while still president of the General Electric Co., and before accepting the post of chief of the Office of Defense Mobilization, speaking before the Press Club in Washington, D.C., analyzed and documented the ability of the electric utilities to serve the country's needs under war preparedness conditions during the next five years.

He compared by both horsepower and kilowatt-hours the maximum requirements projected by the government with present capacities, the orders placed on manufacturers for generating equipment and the ability of the manufacturers to produce this equipment.

He concluded that the utilities would have capacity, too, and would be able to serve both the domestic and industrial needs for electric energy throughout this whole period. This would indicate that brownouts and domestic and commercial limitations on the use of electricity during the next five years can be kept to those caused by local disasters.

The Pacific Gas and Electric Co. serving northern California had as its program an investment of $800 million between 1945 and 1950. In sixty-five years prior to 1945, it has been doubled and now stands at 4 million horsepower. Its load is increasing at the rate of 400,000 more horsepower per year and its projected plans are to develop 4,000,000 more horsepower in generating capacity by 1960, thus doubling its generating capacity again in the next ten years. The cost of this expansion will exceed one billion dollars. Orders for the generators and other machinery needed in the next five years have been placed and construction plans are under way.

Retailers Scale Down

Retail establishments will have to adjust to a reduced volume of electrical appliances and supplies in 1951. There probably will be some liquidation of firms in this field late in 1951 and early in 1952. The demand for goods at that time will be heavy enough for most firms to take their capital from the firms profitably. This will cause marginal operators to retire from the electrical retailing business and seek employment elsewhere.

This could amount to 20% of the total firms, but only 10% to 12% of the total volume. The remaining firms will reduce their employees, who will go to war work, cut their expenses and adjust to a smaller sales volume. They will, however, have an increase in their repair and service business.

Wholesalers' Plight Critical

The electrical wholesalers' opportunity to devote his facilities to war work will lag behind the reduction in inventory and sales volume he will undergo. His volume during the first six months of 1951 should enable him to make a small profit, but most of

this could be dissipated during the last six months of the year; 1952 will be a very critical year for him.

At present, we have the largest force of skilled electricians devoting their mechanical skill to domestic and commercial construction that the nation has ever had. This is good.

Contractors Have Little Choice

As home construction is reduced to a minimum and builders turn to war plants, the skills of these men must be employed with a minimum of lost time. This should not present much of a problem but will mean that many families will have to move to new locations since there will not be employment for their services near their present homes.

The situation of the electrical contracting companies will be more critical. Many of them will find it advantageous to retire from the business and seek other employment. Much more of the electrical contractors' efforts will be directed toward maintenance and repairs.

To summarize we can conclude:

1. The electrical industry will produce goods at about the 1949 rate during the first three months of 1951. This is about 75% of the 1950 rate of production and will place appliances and equipment in good supply. Some substitute materials will be used and prices will increase. This will be caused by stock piling of scarce materials.

2. Large amounts of war goods will be produced starting about midyear, and reduce the industries' ability to produce for domestic use to about 50% of the present rate, thus making it necessary to ration some equipment before the close of 1951.

3. The electrical industry can and will expand its manufacturing facilities enough to produce the goods and equipment needed for civilian and war needs.

4. The projected planning and planned investments of the electrical utilities will enable them to serve both civilian and industries' war needs.

5. There will be adjustments of manpower between location — the greatest proportionate amount of it being skilled electricians.

6. Up to 20% of the small retailers of electrical appliances and a similar amount of the small electrical contractors may turn their attention to other work.

7. By proper planning, unemployment can be kept low, but will occur throughout 1951, probably reaching its peak in the second quarter.

What They Propose to do in 1951

Arizona

Central Arizona L&P

Although we at Calapco are planning our 1951 appliance merchandising program for this area with a great deal of caution, we nevertheless feel that, despite restrictions and shortages of some appliances, sizable sales potentials exist locally. Our 1951 program will of necessity be very flexible so that we will be in a position to direct our efforts along whatever lines are necessary to hold appliance sales at a maximum and at the same time increase our electric load.

The Appliance Merchandisers Assn., recently organized in this area, embracing the retailers, distributors, manufacturers, electrical contractors, utility and others interested in appliance promotion, will enable all segments of the industry locally to secure maximum results regardless of the variable conditions which confront us in 1951.

Based on an estimated 70% of the 1950 appliance output, we anticipate electric and gas appliance sales to reach a total volume of $10,670,000. Despite reduced appliance unit sales, the increased price per unit will bring the total dollar volume sales figure up very near the amount obtained in 1950.

All segments of the industry represented locally by our AMA are of the opinion that through such an organization we will be better able to cope with such problems as proper allotment of appliances, establishment of better servicing facilities, the recruitment of new sales personnel, and acceleration of our sales training program.

As a utility we will continue to extend all possible help to the appliance promotional activity through advertising, customer contacts for the development of prospects, appliance demonstrations and displays in an effort to do the best possible job in the months ahead.

Having just recently completed an extensive construction program, we have a surplus of 50,000 kw. of steam-generated power which we anticipate will be sufficient to meet the expanding defense and civilian needs in the immediate future.

Our over-all 1951 sales program slogan, "Get It Done in '51," is indicative of the attitude with which we approach each appliance sales problem ahead.—*Don Willis, general sales manager.*

For the record—the figures regarding customers and kwh. consumption are on p. 114; appliances sales in 1950, p. 118, 119.

Arizona Edison

In considering our brief outline of answers to your questions, please bear in mind our company is relatively very small. We have actively engaged in sales promotion in a limited way, with only a skeleton sales force. Our growth has been considerable, however, in recent years, and the expansion is calling for a new outlook, to provide accelerated sales promotion and customer service programs. We are moving cautiously, but forcefully, to broaden these activities and to expand the personnel group needed to do the job.

Our "point of view" for 1951 and henceforth is *aggressive selling!* We plan to coordinate all activities of our advertising, sales, home service, publicity and allied departments, with these goals in mind: (1) to sell our customers' on the advantages of private utility ownership, under business management; (2) to sell or reawaken our consumers to benefits of free enterprise, of a capitalistic system; (3) to assume leadership in each community we serve in promoting sales of modern appliances through normal outlets of our sales allies; (4) to encourage purchase of appliances by our employees through an employee purchase plan and thereby enlist their aid in selling cheapness and value of our service and public acceptance of new equipment; (5) to assist our sales allies in the field by promotional campaigns designed to better all concerned; (6) to approach each promotion with the customer's welfare in mind and consider each campaign's eventual impact on customer and general public relations; (7) to aid in community development wherever we serve, in whatever way feasible.

The most serious threat to our awakened efforts apparently is production uncertainty, which hinges upon the turn of war events. Therefore, our program will be fluid, open to change almost week by week. But our goals are necessarily long range and will be striven for, regardless

of hardships imposed and delays encountered.

We hope this gives you some understanding of what our utility's policy and position will be in 1951.—*Charles Mueller Jr., director, advertising and publicity.*

California

Burbank PS Dept.

The Public Service Department of the City of Burbank will continue to work aggressively to instill within the minds of its consumers an expanded acceptance of electrical appliances as a means to better living. We have thought in terms of increased usage of accepted appliances, and educating in new fields as electrical manufacturers presented these opportunities. We hope to continue at our present pace. If conditions dictate a shift of policy, we will place increasing emphasis on the educational phase.

Our plans for 1951 include a program of education with a more direct participation by the electrical dealers. It is our feeling that there is more to be gained by satisfying users, particularly during a period of restricted production.

We will continue to pursue an advertising program, highlighting adequate wiring and home lighting. Direct advertising promotion of electrical appliances, however, will share the spotlight with institutional type ads.

More and more time will be devoted to information and guidance in all problems of electrical usage and its related problems. Service to our customers is our first consideration, and we expect to place this relationship foremost.

We do not intend to withdraw from our present activities; rather will we continue with, and expand, an aggressive attitude.—*H. McComas, new business agent.*

California Electric Power

I wish I had answered your letter of Dec. 4 before now. When I received it I was far more sure of being able to carry out a 1951 program than the world events of the past two weeks now indicate.

However, this company proposes to increase its efforts to promote the electric idea in its territory, secure for itself adequate power supplies and generate as great a feeling of friendship among its public as is possible. The future holds uncertainties but this outfit has weathered many a storm of greater proportions than I can now see. I sometimes like to reflect on the report of Marshall Foch, then General, to General Headquarters during the first battle of the Marne in which he said something like this: "Our left flank is retreating, our right flank is crumbling, we attack in the center." That was an expression of courage that many of our contemporaries might well brood upon.

San Francisco's big civic event of the year was its Electrical Wonderland Exposition

You will remember that we are the only utility in the state which has continued actively to sell merchandise. Although the future merchandise picture does not at the moment look rosy, what with scarcity of supply, prices and credit controls, we expect to press this activity just as long as the cow can give down.

In the commercial field we have trebled our force and while this in numbers would not mean much to the great utilities of the state, it does indicate the comparative pressure we expect to exert not only to secure additional kilowatt-hour sales but to help our commercial customers add to their own business.

Our industrial men will have all they can do to keep up with the continuing growth of industrial and military activity.

Our agricultural engineers will be kept constantly attempting to solve pumping, sprinkling and other agricultural problems, particularly as the state grows in population and the demand for agricultural products increases. This has developed into no small problem as water resources are being depleted in certain of our developed areas. We will also support the 4-H Electricity Project program.

By and large, while we know we are facing difficult times ahead, we will take situations as they may develop in stride and will do all we can to help our territory prosper.—*D. B. Wheelock, commercial vice-president.*

California-Pacific Utilities

Additional data in the tabulation on page 111 will supply information which shows the growth of our electric properties during the past five years.

You will note that the growth in the number of customers and the increase in the use of electricity by domestic customers is still at a substantial rate, and indicative of the continued growth of the rural areas of the West. Use of electricity by commercial customers shows a similar increase.

May we call special attention to a 31.5% increase over 1949 in dealer sales of major appliance units per 100 domestic and rural customers. This considerable increase is due largely to the public's scramble for appliances after the beginning of the war in Korea. This resulted in an 85% increase in major appliance sales during the third quarter of this year over the same quarter of 1949.

Dated fixtures were urged to be replaced by Los Angeles League and Dept. of W&P

Reports from the field indicate that many dealers have very few major appliances in stock, and that their replacements are very slow. It is also reported that a few dealers are hoarding appliances that will be sold later, when prices have increased. These reports also tell us that numerous appliance dealers are seriously concerned over their business, and a number of dealers suggest that it will be necessary for them to go out of business unless manufacturers supply them with more appliances than they have received during recent months.

Our 1950 construction program was completed on schedule, and system capacity is ample to take care of the present rate of growth of our business which, as you have noted, is substantial. — *E. A. Nickelsen, commercial manager.*

Imperial Irrigation District

As for our promotional plans during 1951, we intend to continue with present activities, which include a $35 wiring reimbursement on ranges and $20 on water heaters, cooking schools, certified adequate wiring, and direct mail and newspaper advertising.

We do not anticipate any shortage of power supply in the area we serve. Unless appliances become totally unavailable and it appears they will be available for two or three years, we see no reason to curtail our promotional activities. We do not have home economists or outside commercial men. We had contemplated adding these to our commercial department, but may not do so now.—*Paul Post, commercial power superintendent.*

Los Angeles Dept. of W&P

With the many uncertainties as to conditions during 1951, it is of course difficult to forecast policies.

With the record of this department during World War II in maintaining sufficient power supplies for all needs, including a 123,000-kw. load for a wartime aluminum reduction plant, and the maintenance of ample capacity during the water shortages of 1948, together with substantial increases in generating capacity which are in process, this community can be assured as to the adequacy of our supply to meet all foreseeable demands.

The hydroelectric development in the Owens River Gorge will be completed before the fall of 1951, adding 112,500 kw. to our system. A new steam generating plant is planned with an ultimate capacity of 400,000 kw. with two 100,000-kw. steam turbine generating units and their boilers now on order. The first of these units is expected to be operating in 1953, the second unit during the following year, and the other units in ample time to provide for the growing system load. Additional sources of power are in the early planning stage.

With the increased recognition by federal authorities of the importance of amply supply of electric power, whether during a defense period or all-out war, it is expected that these plans will not be restricted as it is believed the essential need can be clearly shown.

Plans for continuation or resumption of electric service for essential and critical uses in the event of major disaster have been well formulated so that the welfare of the community and production for military or important civilian needs will be protected as far as humanly possible.

Promotional policies are the most difficult to forecast under present conditions, with local shortages and local surpluses in residential appliances occurring at the same time. This is disturbing to dealer morale with the result that the dealers tend to operate on a day-to-day basis rather than face the possibilities of emergency squarely and prepare for it. In their trade contacts, our business representatives are encouraging

NUMBER OF ELECTRIC CUSTOMERS — DOMESTIC AND RURAL — TOTAL

Year Ending	No. of Domestic and Rural Customers	Per Cent Increase	Total Number of Customers	Per Cent Increase
Nov. 1950	18,919	5.2	23,281	5.0
Dec. 1949	17,994	5.4	22,171	3.P
Dec. 1948	17,062	7.2	21,402	5.3
Dec. 1947	15,910	6.7	20,334	7.6
Dec. 1946	14,911	..	18,889	..

ANNUAL USE OF ELECTRICITY PER DOMESTIC CUSTOMER

Year Ending	Annual Kwh. per Customer	Per Cent Increase
Nov. 1950	3280	9.9
Dec. 1949	2984	11.6
Dec. 1948	2675	19.4
Dec. 1947	2240	27.0
Dec. 1946	1760	..

DEALER MAJOR ELECTRIC APPLIANCE SALES — (DOMESTIC AND RURAL CUSTOMERS)

Year Ending	Refrigerators	Ranges	Water Heaters	Total Units	Units per 100 Customers
Nov. 1950	2,996	1,771	1,313	6,080	32.1
Dec. 1949	2,032	1,273	1,009	4,314	24.4
Dec. 1948	1,779	1,389	1,325	4,493	26.3
Dec. 1947	1,372	1,110	1,300	3,782	23.4

the establishment of an over-all long-term policy within which situations could be faced as they may arise. This should include plans for expansion of dealer appliance repair facilities to keep important residential appliances in operating condition if new appliances become unavailable, and consideration of new lines of merchandise, to maintain themselves as going concerns during any emergency.

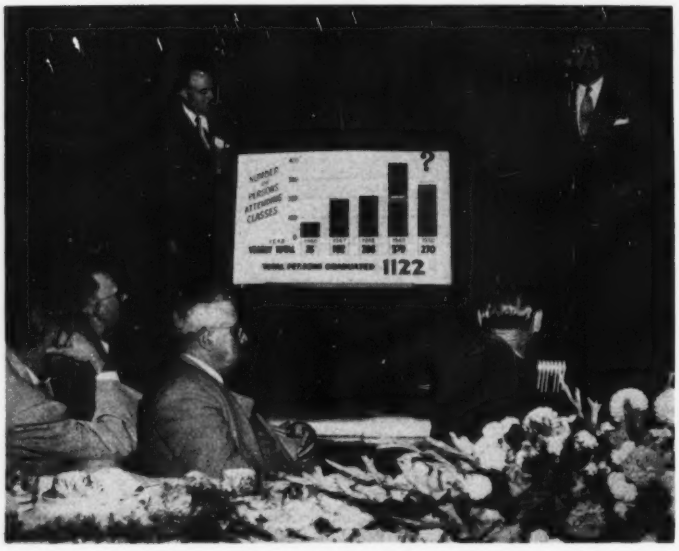
Even though full war conditions should develop, we will continue particular promotional efforts with important industries where the use of new processes or better illumination is a definite aid to increased production. The machine tool survey, which was most valuable during World War II in locating facilities for sub-contracting, has been kept up to date and will be available for the same purpose under any conditions. We shall continue to assist industry in locating plant sites and facilities required for expansion.

The department will probably continue in its advertising to emphasize the availability of adequate power supplies to meet any contemplated demands and the low cost of this power in relation to the benefits which it brings to our customers. Such advertising as may be necessary to advise our customers of the effects of government controls on our operations or on their service will be used. Promotional type of advertising will, of course, be affected largely by the economic conditions met with or anticipated during the year, and will conform to the needs of our national economy.—*Charles C. Snyder, business agent, power system.*

Pacific Gas and Electric

As this is written, the world situation is extremely critical and it is impossible for anyone to foresee accurately all the conditions and problems that will confront our industry during the year 1951. However, one thing appears to be certain. Our economy will be heavily weighted with the defense activities necessary to meet the threats or actual attacks of those who would destroy our way of living. In short, business-as-usual is out! The electrical industry is a vital and indispensable part of our total economy. Whatever burdens are placed upon our people will also be placed to a maximum degree upon this industry.

We must be prepared to do everything possible to contribute to our external strength. Moreover, we must maintain our internal strength at the same time. This can be accomplished by carrying on with the production of civilian goods on as normal a basis as possible in so far as it does not interfere with the defense program.



Salesmen's training record of San Diego Bureau of Home Appliances for five years

The Pacific Gas and Electric Co. is completing an expansion program of capacity which will produce and deliver an adequate supply of power in our area of service. The cost of our electric construction program during the past five years has exceeded $550 million. We are not stopping at this, but are continuing further to increase our capacity with the objective of placing ourselves in a position to serve whatever load is placed upon us for military preparations. In addition, we aim to supply the needs of our civilian population and our domestic, commercial, industrial and agricultural customers at reasonable prices per kilowatt-hour.

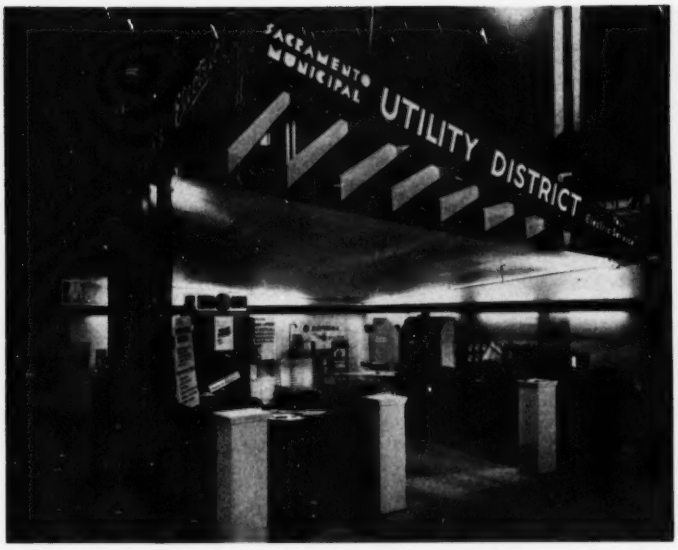
In view of the uncertainties as to the ratio that will obtain between "guns" and "butter," we believe it prudent to plan for a good measure of normal business activities. Our plan for 1951, therefore, includes field manpower to serve adequately new customers and new installations. It contemplates a program of advertising support for electrical appliances, adequate wiring and better lighting. It is set up to permit flexibility to best support the requirements of the industry under changing economic conditions. The Pacific Gas and Electric Co. representatives will continue to maintain contacts with manufacturers, distributors, and retailers in order that we may program our activities to the best advantage of the entire industry.

The dealers have many serious problems ahead involving: (1) supply restrictions, (2) credit term regulations, (3) probable price controls. We propose to sit down with them and talk things over in order that we may be of maximum assistance in the solution of their problems.

It will be our policy to continue to support the Northern California Electrical Bureau in carrying out its very excellent program of long-range promotion, customer education and special trade stimulating activities as may be needed. The Pacific Gas and Electric Co. will maintain its staff of technically qualified representatives to assist contractors and equipment dealers in the sale and installation of commercial, industrial and agricultural electrical equipment and lighting. We will endeavor to maintain flexibility so that we can adjust our program to coincide with the needs of the general economy.—*O. R. Doerr, vice-president in charge of sales.*

San Diego Gas & Electric

As an electric utility serving one of the fastest growing areas in the nation, and subject to the added demands of an important military establishment as well as renewed aircraft manufacturing expansion, this company has a tremendous responsibility to face in 1951. Likewise the



Sacramento MUD spoke for the entire industry at its California State Fair booth

individuals and organizations in any way connected with the electrical industry will be affected. The appliance dealers, electrical contractors, distributors, yes, even the manufacturers will be called upon to play their part in this important job.

The task ahead will be made many times more difficult because of the lack of definite knowledge as to future developments. Over night entirely unforeseen demands may be made for more power, new installations, or special equipment. At the same time we may have to face new restrictions in the use of critical material, and be further limited as to available manpower. There may be an abundance of certain appliances and materials but at the same time critical shortages of other things just as necessary to provide for the ultimate utilization of electric service. These problems must be met by all of us working together as a team.

The year 1950 and prior years can hardly be used as an indication as to what we may expect in '51, yet the past should be reviewed as one of the few guides for the future.

First let's take a look at population growth. The 1950 census showed some 536,000 persons in San Diego County, as compared with 289,348 in 1940, or an increase of 85%. While the growth within incorporated cities was a healthy 69%, the growth in suburban and rural areas was 163% during this period. This sort of growth indicates entirely new development from the raw ground up; new subdivisions, new homes, many all electric, requiring line extensions by the utility, new wiring jobs by the contractors and heavy appliance sales by the dealers.

The gain in new residential customers during 1950 exceeded 10,000 as compared with an average of some 7,300 in the four prior years. Building is still continuing at a rapid pace, better than 1,000 permits per month. The need for additional residential accommodations is still urgent, just as urgent as ten years ago. In 1940 the population per residential electric customer stood at 3.7 and it now has increased to 3.8, which trend is contrary to normal expectancy. It appears that the record breaking residential building activity of 1941 may have to be repeated. In fact, a recently reported survey indicated the need for 35,000 additional residential accommodations in this area.

In the past period of rapid expansion in the number of customers, there continued a substantial growth in the consumption of electricity per customer. This increase has amounted to more than 100 kwh. per customer each year since 1945. The average use in 1950 was approximately 1,880 kwh. per customer as compared with 1,338 kwh. in 1945. This is largely the result of active promotion and sales of domestic electric appliances, accomplished through the cooperative efforts of the utility and the dealers. This cooperative effort is made possible through the Bureau of Home Appliances of San Diego County headed by J. Clark Chamberlain.

During the year 1950 the total dollar volume of appliance sales amounted to over 31 million dollars. In nearly every case the sale of individual appliances during 1950 exceeded the number of that appliance sold in 1949. Outstanding was the sale of 40,500 television sets as compared with 14,500 in 1949. There were nearly 25,000 refrigerators sold in 1950 as compared with 18,000 in 1949. Substantial gains were also noted in the sale of home and farm freezers, automatic washers and dryers. Gains were also shown for electric ranges and water heaters. It is estimated that there are now some 18,800 electric ranges and 15,600 water heaters served by the company, largely in rural area, and as new building progresses, in this direction there is developed a fertile field for such sales.

The increase in numbers of residential customers, and use per customer, has resulted in an over-all increase in residential kwh. sales of approximately 13% in each of the past two years. While not as stable as the residential, substantial gains have also been made in basic commercial and industrial sales. It is expected that these latter classifications of service will continue to gain during 1951, reflecting the cause for, or effect of, increases in population.

In addition to the foregoing basic classifications of service, it is of course expected that there will be larger gains in the aircraft industry and large military establishments served by the company. All this adds up to additional kilowatts as well as increases in energy sales.

To meet this increase the company during 1950 placed in operation Unit No. 3 at its Silver Gate steam generation station. This unit is rated at 30,000 kilowatts. Construction is going forward to take care of unit No. 4, another 50,000-kw. unit, which is scheduled for operation in 1952. At present the company has a total rated generating capacity of 237,000 kw., having an actual capacity of approximately 288,000 kw. In addition interconnection facilities with other companies are rated at approximately 66,000 kw., of which 37,000 is on a firm basis. The peak demand on the system during 1950 was 250,000 kw. and a peak of 253,500 was carried in January 1949. Extensive additions have been made in the company's 69,000-volt transmission system as well as large increases in substation capacity during the past year.

Thus, while it is expected there will

Customers and Consumption

Utility Territory	Average Annual Kwh., Residential					Domestic		Commercial		Total, All Classes	
	1950	1949	1948	1947	1946	1950	1949	1950	1949	1950	1949
Alameda Bureau of Elec.	1,690	1,624	1,556	2,625	1,480	13,285	12,983	1,713	1,725	15,119	14,801
Anaheim L&W Dept.	1,500	1,000	....	....	....	4,561	4,251	1,087	1,046	5,648	5,297
Arizona Edison Co.	1,700	1,900	890	....	1,100	20,000	18,000	4,000	3,800	24,000	22,800
Ashland Mun. L&P	....	....	3,960	....	....	9,367	2,266	393	345	2,786	2,626
B. C. Electric, Vancouver	2,360	2,056	1,810	1,450	1,318	154,800	148,500	28,882	27,250	183,682	175,750
B. C. Electric, Victoria	1,993	1,530	1,500	1,425	1,336	34,524	32,706	5,544	5,428	40,068	38,134
Burbank, Pub. Serv. Dept.	1,740	1,732	1,591	1,550	....	25,206	24,136	3,017	2,782	28,223	26,918
Caliente PU	....	4,000	....	....	....	....	327	....	....	....	....
Calif. Elec. Power	1,750	1,840	1,720	1,450	1,476	42,000	39,253	8,400	7,608	56,000	51,958
Calif. Oregon Power	4,920	4,700	3,975	3,590	3,228	57,513	54,268	....	12,454	....	66,854
Calif. Pacific Utilities	3,280	2,950	2,540	2,240	1,760	16,459	15,715	4,278	3,957	23,281	22,171
Central Ariz. L&P	1,867	1,950	1,811	1,689	1,569	55,445	52,600	11,439	10,820	66,884	63,420
Cheyenne L Fuel & P	1,400	1,800	1,505	1,500	1,400	8,816	8,338	....	....	....	....
Coast Counties G&E	1,870	1,710	1,461	1,450	1,250	33,873	32,368	8,527	8,077	42,400	40,445
Colorado Central Power	....	....	1,400	....	....	....	....	....	....	....	....
Colorado Springs PU Dept.	....	1,500	....	1,325	1,092	....	16,690	....	4,000	....	20,690
Colorado Utilities	1,450	1,350	....	....	....	1,740	1,799	600	617	2,340	2,416
El Paso Electric	....	1,830	1,680	1,610	1,557	46,800	41,426	....	....	....	....
Ely L&P	1,524	1,337	950	592	....	1,291	1,265	452	465	1,743	1,730
Eugene Water & Electric	6,200	5,800	5,200	5,000	4,400	16,700	15,676	2,450	2,339	19,150	18,015
Fort Collins L&P Dept.	1,980	1,586	1,510	....	....	6,027	5,711	....	....	....	....
Frontier Power Co.	1,080	950	880	896	761	4,350	4,214	717	700	5,067	4,914
Glendale PS Dept.	1,600	1,500	1,500	1,600	1,400	32,500	31,361	4,860	4,691	37,360	36,052
Grays Harbor PUD No. 1	4,368	3,746	2,301	2,593	1,800	15,798	15,419	....	3,069	....	18,775
Hawaiian Electric	2,690	2,570	2,400	2,125	1,932	61,792	59,865	14,232	13,800	76,024	73,665
Heber L&P	3,500	2,600	....	1,600	....	1,288	1,100	....	....	....	....
Helper City Mun.	3,600	....	1,500	....	....	850	800	....	....	....	....
Hilo Elec. Light	1,835	1,618	1,400	....	....	10,915	10,616	1,850	1,779	13,850	13,481
Home G&E, Greeley	2,785	....	2,020	....	....	9,688	9,149	....	....	....	....
Idaho Falls Elec. Light	....	....	....	5,600	....	....	....	....	....	....	....
Idaho Power	4,580	4,250	3,815	3,400	2,900	96,913	93,250	....	13,702	....	106,702
Imperial Irrig. Dist.	3,800	3,500	3,400	2,400	....	20,350	19,886	3,750	3,705	26,150	25,554
Logan, City of	2,700	1,600	2,540	....	....	5,154	4,817	644	532	5,798	5,349
Los Angeles Dept. W&P	1,620	1,648	1,505	1,470	1,375	571,000	549,431	121,850	120,538	692,850	669,969
Modesto Irrig. Dist.	2,538	2,400	2,400	2,500	....	16,684	15,623	2,842	3,312	20,089	18,935
Montana-Dakota Util., Sheridan	1,500	1,465	....	....	....	4,843	4,854	798	794	5,641	5,648
Montana Power	2,155	1,955	1,670	1,469	1,325	101,200	97,240	15,200	14,818	119,000	114,544
Mountain States Power	3,635	3,375	3,000	2,700	2,100	87,300	84,518	16,200	16,434	104,000	101,472
Murray, City P&L	....	....	....	....	....	....	3,302	....	....	....	....
Pacific Gas & Elec.	1,905	1,830	1,620	1,607	1,495	1,065,300	1,000,846	224,200	211,935	1,334,300	1,265,757
Pacific Power & Light	4,698	4,355	3,970	3,700	2,673	120,991	117,517	21,296	20,188	143,812	139,287
Palo Alto City Elec. Dept.	1,701	1,639	1,509	....	....	8,365	7,719	1,644	1,515	10,009	9,234
Pasadena L&P Dept.	1,690	1,635	1,590	1,515	1,380	35,641	34,322	4,494	4,170	40,135	38,492
Payson Mun. system	....	1,700	2,500	....	....	....	1,500	....	....	....	....
Portland GE	5,344	5,004	4,553	3,800	3,197	181,796	174,574	20,783	20,204	204,374	196,403
Price Light Dept.	3,600	....	3,400	....	....	2,000	1,950	....	....	....	....
Provo PU Dept.	2,680	2,498	2,000	1,712	2,412	6,850	6,614	....	....	....	....
P. S. of Colorado	1,500	1,423	1,350	1,219	1,087	169,000	160,051	....	24,341	....	192,060
P. S. of New Mex. (Albuquerque)	1,277	1,104	1,092	1,000	900	50,368	45,238	....	....	....	....
P. S. of New Mex. (Deming)	1,192	1,063	1,044	968	885	1,625	1,505	....	759	....	2,295
P. S. of New Mex. (Las Vegas)	1,271	1,110	1,070	908	830	2,829	2,701	658	649	3,487	3,350
P. S. of New Mex. (Santa Fe)	1,150	1,060	960	780	880	7,300	6,756	....	....	....	....
Puget Sound P&L	4,750	4,310	3,840	5,150	2,660	212,000	204,341	24,500	23,842	237,500	229,105
Raton Public Service	1,630	1,915	1,676	....	....	2,191	2,168	685	649	2,876	2,817
Rawlins Elec. Co.	1,440	1,440	....	....	....	2,000	1,500	....	....	....	....
Riverside L Dept.	1,992	1,500	1,620	1,416	1,800	14,873	13,935	1,736	1,691	16,609	15,626
Sacramento MUD	2,100	2,055	1,885	1,838	....	75,300	69,000	11,800	11,000	90,700	83,500
Salt River Valley Pr. Dist.	3,374	5,000	3,200	2,900	2,200	20,800	18,513	....	750	....	19,150
San Diego G&E	1,884	1,857	1,647	1,541	1,444	150,200	139,875	24,600	23,624	182,500	171,010
Seattle City Light	5,638	5,212	5,070	4,525	4,099	104,500	101,070	15,450	15,172	120,790	117,000
Sierra Pacific Power	3,450	3,300	2,869	2,800	2,520	21,500	20,574	....	3,650	....	24,400
So. Calif. Edison	1,510	1,495	1,382	1,400	....	787,000	729,249	166,000	161,343	953,000	890,592
So. Colorado Power	1,662	1,590	1,510	1,409	1,300	29,600	28,557	....	....	....	....
So. Nevada Power	9,100	10,408	8,253	6,800	5,816	10,180	8,980	....	....	....	....
So. Utah Power	2,745	2,048	....	....	....	3,787	3,395	....	650	....	5,400
So. Wyoming Util.	....	1,180	....	....	....	....	4,920	....	....	....	....
Southwestern PS	1,276	1,250	1,085	....	....	16,976	14,333	....	3,859	....	18,192
Spanish Fork Mun.	....	....	....	....	....	....	1,500	....	....	....	....
Springville Mun.	....	2,100	2,520	....	....	....	1,900	....	....	....	....
Tacoma City Light	6,600	6,200	5,700	5,100	4,500	46,600	45,075	5,600	5,444	54,330	51,786
Telluride Power	2,340	2,000	1,776	1,000	850	6,748	6,547	1,160	1,140	7,908	7,687
Tucson GEL&P	1,628	1,670	1,617	1,560	1,431	33,925	31,162	6,691	6,335	40,616	37,497
Turlock Irrig. Dist.	....	3,080	....	....	....	....	12,790	....	....	....	....
Uintah P&L	....	....	2,350	....	729	....	....	....	....	....	....
Utah Power & Light	2,692	2,548	2,314	1,996	1,770	150,739	145,577	16,064	15,647	169,885	163,984
Washington Water Power	5,565	5,144	4,709	4,201	3,767	102,000	97,935	13,000	12,919	115,800	111,708
Western PS Co.	1,400	1,360	1,234	1,300	....	4,100	3,800	....	....	....	....

be many problems to contend with in the coming year, sales are expected to be high all along the line, and there should be an ample supply of power to take care of the demand.—*H. G. Dillin, vice-president in charge of sales.*

Southern California Edison

The unprecedented growth of the area served by our company, and the industrial, agricultural and residential expansion which has taken place has brought unusual pressures upon our sales staff.

Until industry in general, and the manufacturers of appliances and equipment in particular, have definite information as to the amount of restrictions that will be placed upon their output, we cannot be sure of the equipment that will be available to the public. We are, however, submitting the quotas originally planned for 1951, fully realizing that some shortages may develop in certain classifications.

With more than 60,000 new homes added in 1949 and an all-time record of 70,000 in 1950, we have here in Southern California an unprecedented market for the sale of domestic appliances. This, coupled with the expansion of industry which is taking place, presents unusual market opportunities for the entire industry. Many items will be placed under priority by the government, but will undoubtedly be in sufficient supply to warrant sales effort on our part to increase their general use. We are speaking

specifically of the "mighty midgets," commercial cooking and industrial heating.

Those dealers and electrical contractors who have rendered good service during the past years will now have an opportunity to consolidate their position and firmly establish themselves in the community by rendering the proper repair service to their old customers.

We expect to carry on our promotional efforts at about the same level as 1950.—*H. C. Rice, sales manager.*

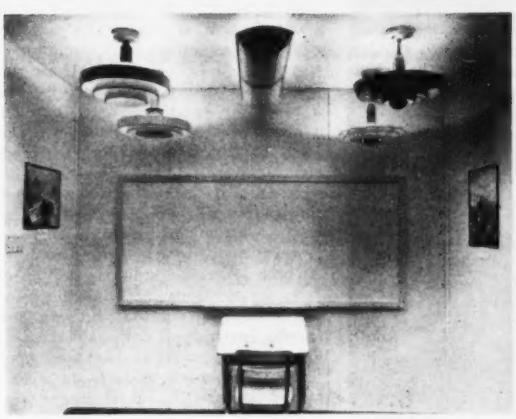
Montana

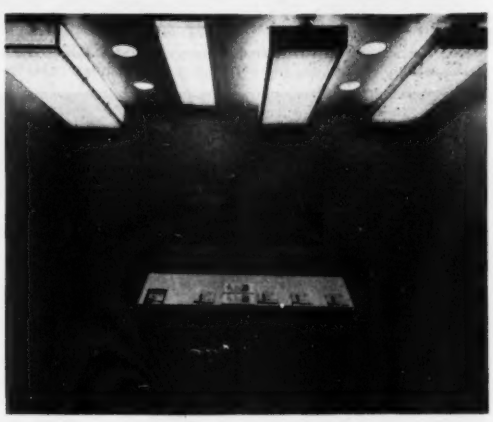
Montana Power

At this time of year it is customary to review the preceding twelve months and, as best as humanly possible, to analyze an equal amount of future time. Nationally the electrical industry can look back upon an important and successful year. In Montana the same kind of year is behind us. During 1950 the industry has rendered increased and substantial service to the people, to commerce and to industry in the Treasure State. This has been achieved through the co-ordinated efforts of manufacturers, distributors, dealers and the Montana Power Co. This same spirit of cooperation will prevail in the coming year. It may be that there will not be quite so much to work with, but we shall do the best we can with what we get.

In the "life or death" struggle which confronts our country the future is uncertain but our responsibilities are clear. Montana's electrical industry and each of its individual members is determined to do whatever they can, and to make whatever sacrifices are necessary, to arm the nation and to carry on those activities which will save our country and preserve the American way of life.

During 1950 this company experimented with a new type of rural sales campaign in which bonuses were paid salesmen for sales of certain designated load-building appliances to rural customers which the company specifically classified. The campaign resulted in the placing of 982 of the important load-building appliances among 6,617 eligible farm customers. Not all of our rural customers were eligible. I feel that inasmuch as this was an experimental activity with us, and the first of its kind, that the campaign was definitely a success. I am sure that if we repeat it and if appliances are reasonably available in 1951 that the next campaign will be an even greater success.—*D. J. McGonigle, general sales manager.*

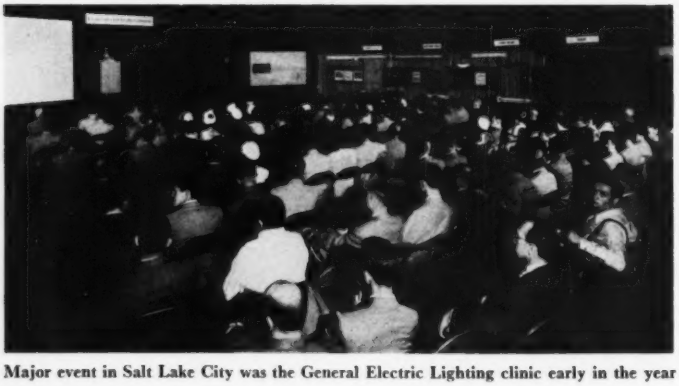




Built in units so that it can be taken to a number of fairs, the Southern California Edison exhibit at Los Angeles County Fair gave lighting recipes for offices, factories, schools, stores, homes **(shown p. 74 Nov.)** **in a way to convince the crowds attending**

Mrs. Malin, home economist, PS of New Mexico and dealers Kinney, Davis, Morris, Huning, Branham and Jameison, at the Select-a-Range cooking school in Albuquerque

When Casper, Wyo., celebrated Mountain States Power Co.'s 25th anniversary with it, Vice-President W. D. Johnston cut a big birthday cake for everyone to participate



Major event in Salt Lake City was the General Electric Lighting clinic early in the year

Oregon

Pacific Power & Light

Our projected activities as they will relate to load building, to electrical appliance merchandising, to dealer and manufacturer cooperation and similar phases of our operation in 1951 are as follows:

1. At present we do not plan on an intensive load-building program for the coming year. Because of favorable water conditions throughout the Pacific Northwest, it appears that the region's power supply may be reasonably adequate to see us through the winter season. However, the power pool is having to carry a very heavy load, and the margin of reserve is so narrow that no one can feel easy about the situation.

2. As you know, we discontinued all direct merchandising of electrical appliances several years ago. This appears now to be our permanent policy, for the dealers of our territory have done a splendid job of keeping up with the demands and needs of our customers for the latest and best in electrical housewares and farm and home conveniences.

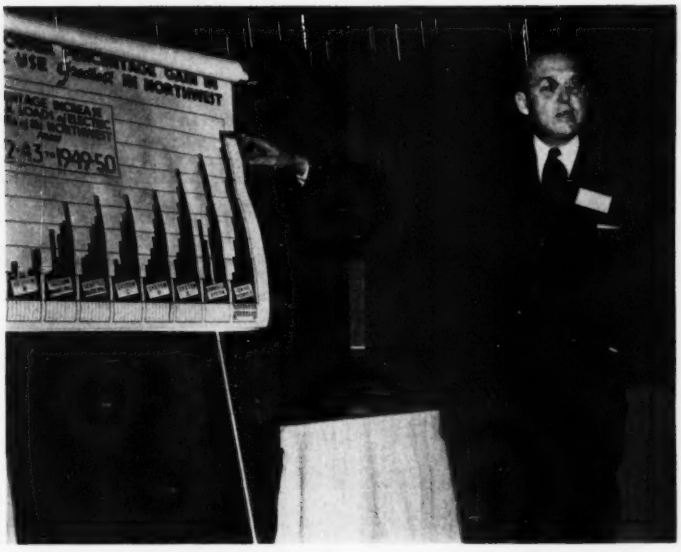
3. We hope to continue our monthly survey of electrical appliance sales within the territory served by us and to publish and make available to all dealers, distributors and manufacturers doing business within the area, the monthly statistical report called *Current Plugs* which appears to have been so acceptable and useful to the trade in the past. From time to time it may be possible for us to carry some institutional advertising, to distribute literature of an educational nature on better lighting, electric cooking, cost of doing things with electricity as compared with competitive fuels, and other materials for the good of the industry of which we are a part. We hope also to be able to assist our customers in whatever problems may arise involving their use of electric service.

None of us knows, of course, what the present world situation will bring in the way of new problems and uncertainties in the next twelve months. At best, it seems certain that all of us face the necessity of adjusting ourselves to whatever may be required in the interest of national security. Our earnest hope is that we may work together successfully to maintain the economy upon which our way of life is based while meeting the military challenge of the enemies of freedom. On our part, we shall do every-

Provo's friendly booklet for new customers

thing we can to help our friends and co-workers in the electric industry with the problems that arise along the way.

To be able to expand our facilities fast enough to keep pace with the growing needs of the people of this area, as a full scale preparedness program gets under way, will be quite a problem in itself. Nevertheless, we want to assume our full share of responsibility along with the dealers, distributors, manufacturers and contractors for the good of the industry as a whole.—*Cecil A. Root, general sales manager.*



Idaho Power's President T. A. Roach indicates the company's growth in electric load

Utah

Utah Power & Light

Our thinking at present is that the volume of appliances and equipment available will be the factor determining what will be done in our load-building activities for 1951. Our plans definitely call for the continuation of promotional activities, stressing particularly all those services which we consider of a competitive nature—principally ranges and water heaters. In addition, our promotion will cover lighting and, at least on a moderate basis, some of our activity will be directed to the more recently developed and less accepted items, such as the dishwasher, disposal unit, clothes dryer, television, etc.

Might add further that during the first quarter of this year we are not looking for much of a reduction in the supply of appliances and equipment. However, after that period, there doubtless will be more of a shortage, depending of course on what happens in the way of restrictions, controls, etc. Also, recently enacted controls no doubt will have the effect of reducing new construction.

We are advising the industry locally that there will be plenty of power available in our territory. Our expansion program announced in 1949 is progressing satisfactorily, assuring us of an ample power supply. This, of course, supports our plans for continuation of our sales promotional activities.—*W. A. Huckins, sales manager.*

Washington

Seattle City Light

It is obvious that the use of electricity has brought to the Pacific Northwest perhaps the highest average standard of living in our country. In the home, business and industry the utilization of electric energy has been applied to relieve the many burdens of the working day.

Seattle City Light, in the hub of this area, has always been a leader in the promotion of constructive uses of electricity. This utility has long recognized its many contributing values to the community, as is evidenced by electric living in our Seattle homes, the average annual use per home having exceeded 5,600 kwh. This is to be compared with the average annual use per home of 1,700 kwh. in 1940.

The growth is due to electric cooking and water heating. Low electric rates, plus helpful utility subsidy of wiring and plumbing installations in the older homes, created customer acceptance. The new All-Electric rate, instituted in 1940, provided additional inducement to new residence construction and also has acted as an effective stabilizing medium.

Uses of electricity such as cooking and water heating have been encouraged because of their beneficial effect on system load factor. In order to provide and protect low electric rates it is necessary to promote uses that contribute to improvement of this operating efficiency.

Although there may be no future in the past, it is well to review the factors as we plan for and try to look ahead.

It is natural for the electric industry to expect leadership and guidance from the electric utility. We have recognized this responsibility and striven constantly to produce and distribute a product that has become so vital to our welfare and economy.

Development of the Skagit River hydro power resources, owned by the city of Seattle, has progressed through the years with foresight and creditable results. With the recent addition of the fourth generator to the Gorge Power plant, the output will be increased by 40,000 kw. of new power; total 100,000 kw. at present head. The present total peaking capability of our hydro plants is 268,000 kw. With favorable conditions, the first 90,000-kw. unit of the Ross plant will be available for use in 1952. Two additional 90,000-kw. units will follow in 1953.

For many years a private electric utility has competed for business with

the municipal plant. The city of Seattle has now arranged for the purchase of this private company's business and efforts formerly used to meet this competitive condition will now be directed to provide additional services beneficial to the customer, the electric industry and the electrical utility.

Our local electric industry is a healthy growing business. Each segment can be justly proud of the part it has played in providing the community with our high standard of electric living. There is but one growing tendency that appears to jeopardize the future. This is *costs* beyond the ability of the average consumer to afford. Let us not cause electric wiring materials, their installation, or the equipment itself to become premium merchandise. We believe that

Appliance Sales

	Domestic Customers	Refrigerators 1950 Sales	% Sat.	Ranges 1950 Sales	% Sat.	Water Heaters 1950 Sales	% Sat.	Freezers 1950 Sales	% Sat.	CLM Lamp Sales	Evaporative Coolers	Automatic	Washers Conventional	% Sat.
ARIZONA														
Arizona Edison	20,000	4,000	46	2,500	43	1,500	43	500	...	...	...	...	...	...
Central Arizona L&P	55,445	10,867	90	1,029	8	402	4	1,417	5	...	4,041	4,616	10,000	70
Salt River Valley P Dist.	20,800	500	80	500	27	300	25	300	10	...	2,000	600	300	65
Tucson G L&P	33,925	...	80	...	10	...	4	...	...	...	...	...	...	...
BRITISH COLUMBIA														
B.C. Elec. Ry., Vancouver	154,800	15,000	38	8,000	26	4,000	13	75	...	...	...	1,150	12,000	72
B.C. Elec. Ry., Victoria	34,524	2,500	28	1,550	24	425	9	15	...	...	...	325	1,800	67
CALIFORNIA														
Alameda Bur. of Elec.	13,285	400	90	250	24	10	2	25	5	...	...	300	200	70
Burbank PS Dept.	25,206	400	80	150	17	25	3	60	5	...	...	120	250	60
Calif. Elec. Power	42,000	3,000	90	800	30	525	10	800	10	2,482	2,000	1,000	600	70
Calif. Pacific Utilities	16,459	2,996	86	1,771	49	1,313	37	250	15	...	75	650	2,100	80
Coast Counties G&E	33,873	3,000	87	1,200	15	600	12	480	5	100	12	1,300	1,200	30
Glendale PS Dept	32,500	1,000	65	500	20	100	3	...	...	...	...	...	...	...
Los Angeles Dept. W&P	571,000	...	77	5,300	9	2,330	4	...	...	...	...	...	...	...
Modesto Irrig. Dist.	16,684	15,000	..	5,200	..	1,935	..	...	...	...	...	...	...	..
Pacific G&E	1,055,300	134,000	70	26,300	13	9,800	8	21,800	4	...	16,300	60,500	52,000	73
Palo Alto Elec. Dept.	8,287	...	..	...	..	...	..	...	..	...	...	...	...	..
Pasadena Mun. L&P	35,641	...	..	700	11	100	3	...	..	...	...	...	...	..
Riverside L Dept.	14,873	...	80	450	26	56	5	...	..	...	...	...	...	..
Sacramento Mun. Util. Dist.	75,300	12,797	..	3,036	..	560	..	2,158	..	...	...	...	11,050*	..
San Diego G&E	150,200	24,685	..	3,495	..	2,540	..	5,400	..	...	...	11,400	11,625	..
So. Calif. Edison	787,000	61,627	57	10,634	10	2,783	4	10,253	3	43,098	5,780	...	63,787*	60
Anaheim Dept. LP&W	4,561	...	..	200	..	...	..	...	..	...	...	...	...	..
Imperial Irrig. Dist.	20,350	3,000	..	650	..	275	..	425	..	...	...	750	1,500	..
COLORADO														
Fort Collins L&P Dept.	6,027	650	65	325	70	100	30	200	30	...	100	150	250	80
Frontier Power	4,350	300	90	200	40	100	25	50	5	...	5	50	300	95
Home L&P, Greeley	9,688	1,430	65	794	70	250	35	50	30	...	...	150	640	80
Public Service of Colo.	169,000	...	80	...	18	...	10	...	3	...	...	...	...	65
So. Colorado Power	29,600	3,300	85	600	24	185	7	240	3	...	80	660	1,875	80
HAWAII														
Hawaiian Electric	61,972	...	..	...	..	...	..	...	..	...	...	...	...	..
Hilo Elec. Light	10,915	500	..	400	..	250	..	40	..	...	...	200	...	..
IDAHO														
Idaho Power	96,913	13,308	88	11,093	72	6,190	56	3,519	15	..	293	4,159	2,406	82
MONTANA														
Montana Power	101,200	...	83	5,500	40	2,500	9	...	..	...	...	...	...	.
NEVADA														
Sierra Pacific Power	21,500	3,000	77	1,215	56	670	24							
Southern Nevada Power	10,180	1,120	96	800	92	650	90	150	10	...	25	400	650	80
NEW MEXICO														
Pub. Serv. of N.M., Albuquerque	50,368	5,500	..	1,200	..	250	..	800	..	...	...	...	...	..
Pub. Serv. of N. M., Deming	1,625	40	75	20	1	5	..	30	1	...	70	25	20	20
Pub. Serv. of N.M., Las Vegas	2,829	125	..	40	..	30	..	60	..	...	...	50	200	..
Pub. Serv. of N.M., Santa Fe	7,300	400	70	250	..	75	..	100	..	...	...	200	400	75
Raton Public Service	2,191	...	..	...	..	...	..	...	..	...	...	...	...	..
Southwestern PS	16,976	1,680	..	435	..	70	..	220	..	...	...	520	476	..
OREGON														
Calif. Oregon Power	57,513	...	..	3,837	58	4,012	53	...	..	...	...	...	...	..
Eugene Water & Elec. Bd.	14,700	...	..	13,360	90	11,000	60	...	..	...	...	...	...	..
Mountain States Power	87,300	...	75	...	52	...	38	...	4	...	...	...	...	61
Pacific Power & Light	120,991	30,000	..	23,000	..	11,900	..	6,500	..	...	...	13,600	13,200	..
Portland GE Co.	181,796	...	77	...	68	...	56	...	..	...	...	...	...	..
UTAH														
Heber L&P plant	1,288	50	60	25	25	25	25	10	5	...	...	25	25	90
Helper City L&P	850	50	95	50	60	50	60	20	10	...	10	50	10	80
Price Light Dept	2,000	...	..	...	..	...	..	...	..	...	...	...	...	..
Provo City Utilities	6,850	...	38	...	14	...	..	...	..	...	...	...	...	..
Southern Utah Power	3,787	...	80	...	52	...	42	...	4	...	...	...	...	90
Telluride Power	6,748	530	..	320	49	465	29	280	..	...	...	...	...	..
Utah P&L	150,739	16,572	85	10,881	45	5,986	24	4,143	5	23,008†	155	6,180	9,818	80
Logan Mun. Plant	5,154	...	..	253	..	276	..	...	..	...	...	...	...	..
WASHINGTON														
Grays Harbor PUD No. 1	15,798	...	..	...	50	...	43	...	..	...	...	...	...	..
Puget Sound P&L	212,000	...	75	...	50	...	35	...	..	...	...	...	...	..
Seattle City Light	104,500	...	..	7,500	80	7,500	55	...	..	...	...	...	...	..
Tacoma City Light	46,401	...	..	3,000	74	3,000	68	...	..	...	...	...	...	..
Washington Water Power	102,000	12,646	92	10,844	70	7,399	73	2,831	12	19,101†	700	5,890	6,492	90
WYOMING														
Mont.-Dak. Util. Sheridan	4,843	700	80	300	12	50	1	175	5	500	...	150	375	85
Cheyenne L&P	8,816	2,400	90	400	30	200	10	250	10	...	...	300	1,600	80
Rawlins Elec.	2,000	...	..	...	..	...	..	...	..	...	...	...	...	..
Western Public Service	4,100	600	60	300	20	15	1	85	5	...	...	200	350	75

* Combined figure for automatics and conventional washers.
† Total sales of all types of floor and table lamps, not CLM alone.

the electric industry has an obligation to the consumer. We are confident, through the splendid spirit of cooperation so often proven, that the industry will recognize and safeguard this obligation.—*P. C. Spowart, sales manager.*

Washington Water Power

The fluid conditions existing at this time make it rather difficult to forecast accurately company activities for any definite period of time. However, under present company conditions and conditions affecting the industry both nationally and internationally, we shall continue to carry on, consistent with conditions as they may arise, and give every assistance to our trade allies such as dealers, contractors, distributors, manufacturers and

Appliance Sales

Ironers 1950 Sales	Ironers % Sat.	Dryers 1950 Sales	Vacuum Cleaners	Dishwashers 1950 Sales	Dishwashers Waste Disposers	Radio 1950 Sales	Radio % Sat.	Television Sets 1950 Sales	Television Sets % Sat.	No. of Dealers	Utility Merchandisers No	Utility Merchandisers Yes	
													ARIZONA
...	...	...	...	...	...	...	...	...	...	80	X		..... Arizona Edison
507	2	50	...	250	1,000	8,926	95	5,233	8	150	X		..... Central Arizona L&P
100	5	100	200	300	200	300	75	...	..	90	X		..... Salt River Valley P Dist.
...	..	...	...	...	...	...	100	...	..	36	X		..... Tucson G L&P
													BRITISH COLUMBIA
700	5	80	11,500	80	40	30,000	132	90	..	350	X		.....B.C. Elec. Ry., Vancouver
100	4	12	1,800	50	10	5,000	115	50	..	107	X		.....B.C. Elec. Ry., Victoria
													CALIFORNIA
100	10	100	400	50	20	500	95	3,000	15	8	X		..... Alameda Bur. of Elec.
40	10	10	150	30	25	200	80	700	20	18	X		..... Burbank PS Dept.
250	10	100	4,000	500	250	1,500	100	1,200	30	150		X	..... Calif. Elec. Power
500	10	200	2,500	125	150	...	100	...	..	98	X		..... Calif. Pacific Utilities
480	5	300	2,500	240	200	4,000	99	350	2	84		X	..... Coast Counties G&E
...	..	...	...	...	...	...	...	...	..	60		X	..... Glendale PS Dept.
...	..	...	...	...	...	...	...	205,000	45	465	X		..... Los Angeles Dept. W&P
...	..	...	...	...	...	...	95	...	2	35	X		.....Modesto Irrig. Dist.
12,700	14	7,500	32,200	6,400	...	104,000	98	136,000	7	2,570	X		..... Pacific G&E
...	..	...	...	...	...	...	...	...	..	...	X		..... Palo Alto Elec. Dept.
...	..	...	...	...	...	...	...	...	..	30	X		..... Pasadena Mun. L&P
...	..	...	...	...	...	...	...	...	..	24	X		..... Riverside L Dept.
1,300	..	600	...	...	...	...	...	...	..	120	X		..... Sacramento Mun. Util. Dist.
4,400	..	1,405	14,825	895	4,260	31,350	...	40,500	..	450	X		..... San Diego G&E
9,281	11	2,483	15,539	3,228	22,257	42,488	...	85,880	40	743	X		..... So. Calif. Edison
...	..	...	...	...	...	...	...	...	..	...	X		..... Anaheim Dept. LP&W
120	..	30	...	70	50	...	...	...	..	...	X		..... Imperial Irrig. Dist.
													COLORADO
100	40	100	250	125	36	1,000	78	...	..	34		X	..... Fort Collins L&P Dept.
40	4	10	150	20	10	300	90	...	..	...	X		..... Frontier Power
130	40	25	400	50	36	1,000	78	...	..	34		X	..... Home L&P, Greeley
...	15	...	...	...	...	...	90	...	..	...		X	..... Public Service of Colo.
290	5	95	600	60	40	2,800	98	...	..	28		X	..... So. Colorado Power
													HAWAII
...	..	...	...	...	...	...	...	...	..	150	X		..... Hawaiian Electric
...	..	...	...	...	...	...	...	...	..	15	X		..... Hilo Elec. Light
													IDAHO
1,748	5	1,832	1,981	828	558	12,323	95	...	.	600		X	..... Idaho Power
													MONTANA
...	..	...	...	...	...	...	...	...	..	450	X		..... Montana Power
													NEVADA
...	..	...	...	...	...	...	...	...	..	125	X		..... Sierra Pacific Power
125	12	18	425	225	165	600	90	...	..	28	X		..... Southern Nevada Power
													NEW MEXICO
...	..	100	...	...	...	...	...	2,500	..	85	X		.. Pub. Serv. of N.M., Albuquerque
5	..	4	80	5	5	100	90	...	..	8	X		..... Pub. Serv. of N.M., Deming
30	..	5	150	10	5	150	...	...	..	12	X		..... Pub. Serv. of N.M., Las Vegas
100	3	50	150	25	15	500	90	20	..	12	X		..... Pub. Serv. of N.M., Santa Fe
...	..	...	...	...	...	...	...	...	..	8	X		.....Raton Public Service
254	..	47	620	212	97	1,963	...	...	.	41	X		..... Southwestern PS
													OREGON
...	..	...	...	...	...	...	...	...	..	175	X		..... Calif. Oregon Power
...	..	...	...	...	...	...	...	...	..	...	X		..... Eugene Water & Elec. Bd.
...	*	...	...	...	...	...	97	...	..	195	X		..... Mountain States Power
3,700	...	4,000	14,000	1,500	650	33,000	...	150	..	450	X		..... Pacific Power & Light
...	..	...	...	...	...	...	100	...	..	265	X		..... Portland GE Co.
													UTAH
...	1	...	25	10	.	100	95	...	..	8	X		..... Heber L&P plant
40	10	20	25	10	5	75	95	...	..	4	X		..... Helper City L&P
...	..	...	...	...	. .	...	...	...	..	10	X		..... Price Light Dept.
...	..	...	...	...	..	...	...	...	..	23	X		..... Provo City Utilities
...	3	...	...	...	..	...	95	...	..	100	X		..... Southern Utah Power
...	..	...	...	...	...	...	...	...	..	45	X		..... Telluride Power
2,520	8	1,270	10,232	941	918	18,520	99	6,472	25	1,239	X		..... Utah P&L
...	..	...	...	...	...	...	...	...	..	...	X		.....Logan Mun. Plant
													WASHINGTON
...	..	...	...	...	...	...	...	...	..	40	X		..... Grays Harbor PUD No. 1
...	..	...	...	...	...	...	...	...	..	665	X		..... Puget Sound P&L
...	..	...	...	...	...	...	...	...	..	300		X	..... Seattle City Light
...	..	...	...	...	...	...	...	...	..	...		X	..... Tacoma City Light
1,642	15	2,282	4,893	752	414	29,106	98	...	..	439	X		..... Washington Water Power
													WYOMING
90	10	30	175	45	45	600	90	...	.	...		X	..... Mont.-Dak. Util., Sheridan
200	15	100	450	300	300	2,600	95	...	..	36		X	..... Cheyenne LF&P
...	..	...	...	...	...	...	...	...	..	10		X	..... Rawlins Elec.
75	7	70	350	25	40	2,000	100	...	..	16		X	..... Western Public Service

our customers as we have in the past.

What sales promotional advertising we may have will be coordinated, both with dealers and distributors. Prospects developed through the residential, home service, and farm representatives will be referred to the dealers.

At the present time we are carrying on a planned home lighting program through the residential and home service sections, and a farm utility lighting and heating application program through the farm section.

While lamps and other equipment necessary to carry on this program on the scale desirable are becoming increasingly hard to procure, we are able, by coordinating this program with our dealers, to assist them in channeling their stock purchases to these items, thereby securing a better supply for customers and also a satisfactory turnover for dealers.

We shall continue to provide home service assistance to dealers in the demonstration of cooking, food freezing and lighting in the home. Also, we shall continue group and store demonstrations and small group dealers' sales personnel training.

We shall continue to support and coordinate all promotional programs with the dealer association and through them continue with sales training, business management aids and special services such as adequate wiring plans, step-saving kitchen plans, lighting plans and provide other sales aids such as bulletins and pamphlets.

We shall continue with our adequate wiring newspaper promotional advertising and coordinate this program on an expanded scale through the architects, home builders, electrical contractors, realtor and loaning institutions, and attempt to provide an advisory bulletin service in coordination with suppliers of material as it affects allocation and restrictions. This same advisory bulletin service will be furnished dealers on allocation, credit restrictions and availability of supply.

We shall give every support to our trade allies to help them keep electric use foremost in the minds of our customers, and shall temper the scale of promotional programs with conditions and attempt to keep in operation a well rounded program covering all services, even though they may be reduced to be consistent with conditions, so that when this emergency is finally over we shall all emerge a stronger unit ready to continue full scale programs without having to reconstruct future segment program participation.—*W. L. Thrailkill, assistant general manager.*

Canada

B. C. Electric, Vancouver

So far as 1951 is concerned, we have planned load-building activities both for residential use and for commercial lighting, all of which can be quickly changed if the supply situation for equipment changes or other reasons develop.

Our advisory services for lighting, wiring, farm application of electricity, home service, etc., will be maintained at a high level so that the best possible use can be made by customers of existing equipment and the most suitable new equipment installed for further applications of electric service in industry, business and the home.

One item that will be of interest is the change in the advertising allowance that we pay retail appliance dealers. In the past this has been on a percentage basis of the retail appliance sales dollar volume. Effective January 1951 this will be changed to a unit basis on certain selected appliances, included in which will be electric range, electric storage water heater, home freezer, dishwasher, food waste disposer unit, ironer, clothes dryer and electric bedding. This will enable more promotional effort to be placed on the appliances which have less customer acceptance or more competitive conditions to meet, the need for an advertising allowance on all appliances having been passed due to the relatively high saturations.

The estimate of units sold in 1950 is somewhat higher than that given to Electrical Merchandising as we have had two additional months of actual selling.—*J. H. Taylor, customer service manager.*

B. C. Electric, Victoria

With reference to our sales and promotional plans for 1951, the following are the main features:

1. Advertising allowance on appliance sales.
2. Dealer sales reports.
3. Automatic gas and electric water heater promotion.
4. Gas range promotion.
5. Sales and services training.
6. Window display and store layout advice.
7. Promotional plans for laundry equipment.
8. Cooking schools.
9. Company advisory services.

Our district representatives are trained to cooperate with the wiring inspectors both municipal and provincial, to act as liaison between inspectors and the customer and to advise contractors and electricians on wiring problems with regard to rate structures, etc.

The discrepancy between the estimated figures for domestic customers which we submitted in October and those on this questionnaire is accounted for by a change in our classifications. However, the totals both domestic and commercial remain the same.—*A. W. J. Smith, sales manager.*

A modernized home economics classroom at Everett High School, Everett, Wash., equipped under the Westinghouse five-year appliance replacement plan which insures that future housewives will be trained to use up-to-date electrical equipment and want it

ELECTRICAL WEST

Sales Guide

News Letter

FOR THE ELECTRICAL MERCHANT OF THE WEST

February 1951

Despite an impending drought of materials the major manufacturers of appliances have courageously brought forth new models for '51 and have been showing them to dealers, holding sales meetings, taking orders for stock and display materials and advising selling harder than usual against all the road blocks of credit terms, fear, inflation and "the thing." In general they talk in terms of reasonable supply for the first six months. Honest ones say later models may come with substitutes or stripped of some features. But American ingenuity will bring forth many new materials to take the place of those that go to war.

Ingenious incentive

Meanwhile January sales have been high, much more so than normal. The talk of meat shortages and possible rationing just about cleaned out the stock of home freezers. Stockmen even warn that so much meat hoarding in freezers will bring rationing. . . Meanwhile Carrier Corp. has announced that it will discontinue freezers to use materials for air conditioning equipment.

The deep 6 or 8

Possibility of installing 650,000 garbage disposals, one to every house in Los Angeles, is being studied by the city council. Waste King cooperated with figures as to possible cost, if the city bought in quantity and resold at cost to homeowners; said $75 might be it instead of present $139.95 installed. But major problem is that sewers would have to be enlarged and treatment plants increased at some $30 million cost.

But save on wagons

Metals will disappear from lamp bases, manufacturers who displayed at the California Lamp and Gift Show in Los Angeles Jan. 28-Feb. 2 said, but even ceramics are scarce. Even brass sockets will disappear. But eager buyers were plentiful during the showing, even though few of the lamps displayed were good for illumination.

Lamp these

Chicago Market drew heavy crowds of buyers, as did San Francisco Market as this went to press. Exhibits were filled by holding up deliveries until the show was over, for a week before, most spaces were pretty bare. Many buyers went East hoping to negotiate bigger allocations or find some unwanted inventory. Many looked for possible substitutes for electric appliances--giftwares, furniture, other gadgets.

Scout the East

Although colleges turned down TV offers for basketball, KFI-TV in Los Angeles and Los Angeles Dept. of Recreation cooked up an 8-team league for TV, charging no admission to games for audience, but telecasting the games on a 20 game schedule. Asking price for scholastic games was said to be $80,000, considered too high. Admiral may have paid $250,000 for the Rams football games, Hoffman paid a substantial deficit. TV talks of financing its own sports if unable to afford high asking prices from schools or professionals.

Roll their own

Preparations are all made for the Winter Conference of Bureau of Home Appliances of San Diego, Feb. 15, at House of Hospitality Auditorium, in Balboa Park. An exceptionally compact program again, noon to 3, recess, then 6:30 to 10, will hear latest reports on the outlook, service, remaining in business. Noted speakers include Louis C. Upton, Whirlpool Corp.; H. Leslie Hoffman, Hoffman Radio Corp.; E. Carl Sorby, of Roper; and William A. Blees, Crosley. — Prime program

Phonevision test in Chicago is said to be even a bigger success than anticipated, people even looking at the scrambled pictures for free, trying electric fans and egg beaters to unscramble it, until Zenith also scrambled the sound. Members of the 300-set test group and press have been enthusiastic. — Willing to pay

Imitators of everything the electric range brings forth the gas range has now developed a built-in wall oven and drip-in three-burner top to fit in a 27-in floor cabinet. Chambers Corp. makes it, and Thompson Holmes Ltd. featured it at Western Merchandise Mart. . . Norge gas range, shown by L. J. Meyberg Co., makes much of electric lighting of gas burners as safer than pilots. "Why be half safe?" Go all-electric. — Sincerest flattery

Los Angeles Electric League enlarged its board from 8 to 15 retail and an equal number of manufacturer and distributor members at its annual gathering, Jan. 25, at which retiring president Willard Hellman reviewed the year's accomplishments and made recommendations for '51. Among latter were to have an auditor available to members for consultation on business problems, a traveling window display man to make better use of manufacturers' materials, telling public who members are, an advertising man to advise dealers. New manager Glen Logan promised better press relations, more action, a bi-weekly bulletin with advice about regulations instead of the fancy publication previously issued and sales and service clinics. Ed Hegarty, Westinghouse, told the big meeting, "How to be Better." See story next issue. — New pattern

In Washington Water Power Co. territory that company, with cooperation of Inland Empire Electrical Dealers Assn. will have a home and farm lighting program to revive interest in home lighting and take up slack for retailers, wholesalers and contractors. Present lighting will be surveyed and suggested inprovements told through door-to-door canvass. New lamps and adaptors, reflector floods and other useful devices will be encouraged. — Light bringers

Seattle Appliance & Music Assn. held a special meeting Jan. 24 under co-chairmen Tom Carmichael and Jim Rench, to consider the implications of a proposed state TV set tax, the electrical commission bill, Seattle's refrigeration service ordinance and similar problems. Other items were reports from the several sections recently set up, one on TV warranties and service fees, music activities, and City Light's range and water heater installation program. — Taxes and rules

Phil S. Urner of Bakersfield was reelected a vice-president of the National Appliance & Radio Dealers Assn. at its annual meeting in Chicago during market Week. NARDA had its biggest meeting and drew more national publicity. A. W. Bernsohn, formerly with RCA, has been made new managing director. Ira Lavin, acting as such, becomes public relations man. — Recognition

NARDA Guide Co. which publishes a trade-in guide, changes its name to National Appliance Trade-in Guide and announces a new edition for '51 with a new section on home freezers and a TV handbook, which is offered — Under own name

to each purchaser of a guide. Always a separately incorporated company the relation with NARDA was only one of name.

What's new

New features in the appliances announced within the month by various brands are largely in detail, either of design, construction, trim or added convenience, with a noticeable trend to color, to use of plastic instead of metal, to automatic niceties, and most of them holding the line on prices, even before the freeze. For instance:

Admiral

Admiral—No price advance, 10 models of refrigerators, top ones featuring colored inside trim, shelves in the door, Dual-Temp; 35 TV models, from a swank Tele-Bar down to table models; 7 radios, 2 combinations; 3 electric ranges. Siragusa advocated a drastic idea to FCC. "FM is a dying art," he said, so FCC could make room for 100 more stations by giving FM channels to TV. Ranges have Selectoheat controls; Rotiss-o-matt for broiling.

Dutchess

Appliance Mfg. Co., says it will have no new models of its Dutchess Washers to save metals and costs of new dies.

Bendix

Bendix Radio, in addition to a carryover of its 17-in models, has a new promotional table model at $239.95, 17-in tube; new table model at $279.95, console at $299.95; two deluxe models, French Provincial at $399.95; mahogany with 20-in tube at $479.95.

Easy

Easy Washing Machine Co. holds the price line on its two most popular spindrier models, introduces three new models with color finish, dual control pump, improved water filter.

Frigidaire

Frigidaire officials from the West were in Dayton getting a look and a coaching on the 1951 line which will be shown to dealers in a series of 100 meetings instead of the big show, in February. Announced before was a complete appliance reconditioning program organized as a package which had everything in it. This too will be presented at the series of meetings.

G-E

General Electric sprang something new and wanted in kitchen cabinets, the upper ones lower and more reachable and the doors sliding up instead of opening out into one's face, and a range splash to go right up flush with the bottom of the new cabinets. Also showed 3 new refrigerators with larger freezer compartments, 4 restyled standards, two freezers, an under-counter dishwasher opening from the front but top loading, two new disposals, a medium priced push button range, new clothes dryer with ozone lamp and a touch-toe ironer.

International

International Harvester showed 7 new models of refrigerators with 10 choices of color trim and interior features, shelves in door, full length door, butter compartment, etc.

Kelvinator

Kelvinator announces eight new model refrigerators with many design improvements in each model; four new freezer models from 6 to 20 cu-ft. and seven electric ranges, with many refinements, faster units, color control, etc.

Magnavox

Magnavox introduces a new three-speed record changer that plays 10-and 12-in records intermixed and 7-in records automatically, a lighter pick-up with a flat response to 10,000 cycles without preamplifier and a heavier balanced turntable on ball bearings.

Motorola

Motorola has a TV set that can be used as table model or with a set of legs as a console, in blonde or mahogany, with 20-in tube at $379.95.

Norge

Norge has an "out of this world" electric range with four ways of automatic control, a gas range that has "no match" (borrowed from the electric slogan--matchless) because it lights its burners electrically; four freezer models; three conventional washers; five refrigerators in the low end of the line from $209 to $259, and four on the high end, from $299 to $399, with a choice of gadgets, trims, features and fast or "jet" fast defrosting.

Philco

Philco has added a new wrinkle to its electric ranges in addition to its broil-under-glass, now on even apartment ranges. It is the jiffy-griddle, that fits over the broiler unit, which pulls out, to cook pancakes or hamburgers on it, broil bacon underneath. Also showed three new 2-door refrigerators, eight ranges, four air conditioners, two new home freezers and eight new TV models added to the line, and new radios.

Scott

Scott Radio has a new combination with a 21-in TV set at $1495, or it can be had so as to add TV later at $1095.

Thor

Thor Corp. announces two new wringer-type washers with one piece skirts and legs of molded Fiberglas, and a third with a load control on the front, designed along rocket lines. The Fiberglas material is said to be the strongest material known and impervious to moisture.

Salesmen only

Youngstown Kitchens corrects us to say that its 1951 sales contest is for salesmen only, not distributors. The contest is for sales of its jet-tower dishwasher.

New team

Paul J. Devine, general manager of W. H. Bintz Co., Salt Lake City distributor, was elected president of the Intermountain Electrical Assn. to succeed J. L. Schricker, G-E Supply. James Littlefield, Salt Lake division manager, Utah Power & Light was elected vice-president; Mark Austin, Sunbeam, secretary-treasurer.

TV lamps

Peerlite Mfg. & Supply Co. of San Francisco, announces three new lamps for TV viewing. One is Floralamp, with a copper flowerpot through which subdued light filters without making glaring irritation. A table model is also available. Available with preserved ferns or can be used with real garden plants. The other is a simple urn lamp.

Perpetual salesmen

Kelvinator's president George Mason honored six distributors of its products for 25 years with a perpetual motion clock. Among them were Harry Blythe, Wilmot Hardware Co., Roswell, N. M. and Sam Kahan, Electrical Equipment Co., Phoenix.

New schedule

B.C. Electric Co. has revised its dealer advertising allowances on a scale based on customer acceptance and load value. New unit bonus is $1 for electric range, water heater, home freezer; $2.50 for dish washer and disposer; $1 for ironer; $5 for dryer, 50¢ for electric bedding.

Star cooks

"Range of the Stars" is the slogan and theme of the new program of electric kitchen promotion developed by the Electric Kitchen and Laundry Committee of Edison Electric Institute. It features advertisements picturing Alan Ladd, Broderick Crawford, Eddie Cantor, Robert Young, Jack Benny, Bob Hope, Gene Autry and Pat O'Brien and their wives in their own kitchens. It included cut-outs, newspaper mats, display pieces and consumer folders, mailing pieces, etc., available at low cost.

Branch

Pacific Telecoin Corp. opened a San Diego branch with R. E. Danielson in charge, handling Majestic, Murray, Orley, Puritan and Elna lines.

ELECTRICAL WEST Contractors' News Letter

QUICK NEWS ON TRENDS, LAWS, CODES, MATERIALS, EQUIPMENT, COSTS, WAGES, ETC.

(From our Washington News Bureau)
January 22

All included

The date—Most of industry will be operating largely under orders from Washington after July 1. That's the date set by the Defense Production Administration for the start of a new controlled materials plan. Initial orders, reporting forms for industry and informational material now are being prepared. Business probably will get formal notice of the part it is expected to play under CMP within the next month.

For civilians

New CMP—The new program will bear considerable resemblance to the World War II CMP. It will be based on complete government regulation of the use of steel, copper and aluminum. There will be allocation programs to secure these and other scarce materials for military equipment and such essential civilian activities as electric, gas and other utilities; shipping and other forms of transportation, hospitals and schools.

Proportion

Less than all—But, for a while, at least, considerably less than 100% of the economy will be directly controlled by CMP. The controlled production—that which supplies military and essential civilian requirements—will be taking much less out of the economy than the original CMP at its height in 1945.

Big bites

Difference—One measure of the difference is the demand for metals for military requirements alone. These demands will take less than half the available supply of aluminum and cooper and less than a quarter of the carbon steel this year. Those are big bites, demands that will pinch all other uses of these metals. On the other hand, the military took all our aluminum and most of the copper for long periods during the war.

Brakes applied

Taking steps—Allocations for other essential uses will take more metal, but, theoretically, CMP won't touch the unallocated portions. But the fact is DPA has no intention of permitting a wild scramble for production not used for essential programs. The mobilizers already have taken steps. As military buying started squeezing the supply of materials like copper and aluminum, Washington banned the use of those metals for gadgets, building materials, for decorative trim. Bans on construction, like last week's freeze on commercial building, saved critical materials across the board.

Essentials only

Discouragers—There'll be more such curtailments, before and during CMP, to trim non-essential demands to the shrinking pattern of unregulated production. In effect, this really is government control of all production, since DPA will either ban outright, or shut off materials for, output it wants to discourage.

Gradual conversion

But not all—Obviously the mobilizers want to keep up some production of automobiles and appliances. There will be cutbacks of 10 to 30 per cent in each industry this year, because of material shortages even if Washington doesn't order a flat reduction. But mobilization planners want to keep these production lines going until they can be converted, line by line, to defense work.

All affected

By winter—But by the end of 1951 DPA will be allocating materials for virtually very industry. Deliveries of military equipment will be rolling. All the really essential civilian requirements will be so rated and made part and parcel of CMP. And government-encouraged expansion plant, especially steel and aluminum, will be taking another big bite of available materials.

By request

Schedules—Right from the start CMP will bring scheduling of all defense and other essential production. Makers of such materials and equipment will tell the government how much copper, steel and aluminum they need and when they'll need it. The list will be screened by DPA, which will match them against the available supplies of the three metals. It will grant allocations, not to manufacturers themselves, but government claimant agencies.

How it works

Divvy—The claimant agency—like the Navy for torpedo production—will split metals allocations among its prime contractors. The prime contractors, in turn, will parcel out sub-allocations to subcontractors. All rated orders will be scheduled as to the amounts of materials used and when they are needed, from the initial fabricating stages upward. Thus DPA and the materials suppliers will know in advance the exact requirements under each allocation. This obviates the need for a gigantic police force for CMP—everyone knows just where he stands and there's little or no room for chiselers.

Basic

Hard goods—Theory behind the basic controls on copper, aluminum and steel is the same as it was in World War II. All hard goods use one or more of them. And a war economy is a hard goods economy.

Untangle

Snarls—DPA will use the same controls—scheduling and allocation—to straighten out snarls in the supply lines of other materials. For example, if leather becomes critical, DPA will step in to see that the armed services and civilians get shoes at the expense, say, of leather upholstery. But such programs would be temporary—just long enough to break bottlenecks.

Single and multiple

Priorities—There will be priorities, the present "DO" ratings or, perhaps, multiple-band ratings. These will simply be for the guidance of a manufacturer who gets more than one contract with the same or approximate delivery dates.

Staff

The mechanics of CMP—staff briefing, drawing of preliminary orders and preparation of reporting forms and instructions for industry—are being readied by a small staff under Walter C. Skuce in the National Production Authority. Skuce, who was drafted from an executive job with Owens-Corning Fiberglas Corp., is an old hand at the job. With Harold Boeschenstein he helped gear up WPB for the first CMP in late 1942. He'll probably take his organization to DPA when that agency is formally organized to help it keep the new controls on the track.

Bring together

Consolidate—Before July, most of NPA and the other mobilization agencies scattered around Washington probably will be incorporated in the new DPA. These staffs are expected to form the nucleus of DPA's various industry divisions. Meanwhile NPA is continuing to carry the controls ball, with close coaching from mobilization boss Charles E. Wilson and DPA Chief William H. Harrison. (End of Washington letter)

Kickback is out

Dallas contractors were found guilty of antitrust violation by a federal jury in November and drew fines. The charge was that they had a plan to get a commission from wholesalers on fixtures they did not sell.

Upsets channels

Supreme Court punched a hole and left a question mark in the Robinson-Patman Act by overruling FTC in Standard Oil of N.J. case where the Standard had sold to four outlets at a reduced price to meet competition.

Resumes

Biddle Trade Bureau, says Bill Gudie, manager, will again issue bulletins to its customers interpreting and advising on government orders.

In series

Tentative date set for Rocky Mountain Chapter, IAEI, Denver, was announced by Vic Moulton, secretary, as April 19-20, right after the RMEL meeting, April 15-18. Other chapters in the region may follow in line.

Many prospects

For emergency lighting, much in mind these defense days, U-C Lite Mfg. Co. has a wide range of instant automatic emergency lights started from plug outlets, as well as Big Beam portable hand and emergency lights, according to Steve Babcock, representative.

Useful tools

Westinghouse has a new edition of its Home Wiring Handbook, 155-page guide for wiring popular-priced homes. It describes four degrees of electrical living and the wiring for each. Costs a dollar. Also has a 16-page booklet on farm uses for infrared heat lamps, for free. Packed with ideas.

Copy cats

When San Francisco Electrical Contractors Assn. gave Local 6, IBEW its $2.75 per hour request the seesaw began on Sacramento, San Jose, Oakland and Los Angeles for similar lifts. Sacramento contractors had agreed to a 12½c increase May 1 in lieu of rebate from July to May for work under way or contracted. But San Francisco's generosity upset all other districts again as it did when it opened the vacation gates last June. Sacramento even had a wildcat strike for two weeks. Santa Cruz scale went to $2.60 with a mixture of fringes. Portland also raised to $2.60, a 10c an hour raise but with protection of work contracted prior to Jan. 1.

Another try

Washington legislature has before it another bill, sponsored by an electrical industry group, to provide for fees for state inspection, require licenses, require that all work be done by licensed contractors or electricians, provide that house owners may wire their own homes but require inspection. An electrical commission would set up to examine applicants and administer the law. A similar law was defeated in 1949.

Clinic finale

Los Angeles and Phoenix are to have the General Electric Lighting Clinic in February. The Los Angeles clinic will be Feb. 13-15 at the Elks Club, with two meetings each day, at 3 and 7:30. Sponsor is the Los Angeles Department of Water & Power, with assistance from lighting equipment manufacturers. Schedule is: for architects, Tuesday afternoon; store lighting, Tuesday night; office lighting, Wednesday afternoon; industrial, Wednesday evening; light and vision, Thursday afternoon; residential, Thursday evening.

Football unit designer

Fred J. Wellhouse, lighting application engineer for Westinghouse Electric Corp., retired Feb. 1 after 41 years service. Widely known for his work in street and highway lighting, he served as light control director for the Office of Civilian Defense to head dimout activities for the coastal states during the last war. His successor at Westinghouse will be James H. Burson of Cleveland, says Walter Maytham, Pacific Coast district manager of Westinghouse.

Upgraded

Charles Donahue, formerly chief electrical inspector for Orange County, Calif., was recently promoted to chief building inspector of that county.

Burned out

Globe Electric Co., wholesalers of Seattle, recently suffered a disastrous fire which damaged their three-story building and large stocks. Owned by Reniger and Chamberlain, they were arranging to reopen as soon as possible.

On his own

Charlie Farrell, for several years manager of Pacific Electrical & Mechanical Co., electrical contracting firm of San Francisco, with branches in other cities, resigned and has opened an electrical contracting business of his own.

Adopted

Sacramento County has adopted the uniform electrical code of Pacific Coast Electrical Assn., effective March 1. The city of Woodland also adopted it in December.

Relay rules

Los Angeles Board of Building and Safety Commissioners recently adopted a set of rules for the installation of all remote control relay systems operating at not to exceed 25 volts or 50 watts. In general the rules call for what would be considered a good workmanlike installation, with no unreasonable conditions.

Takes it easy

H. C. Reid, prominent electrical contractor of California, a pioneer in San Francisco, closed up his business the first of the year and retired.

Briefing sessions

"Industrial Lighting for Defense Mobilization" will be featured in a compact one-day presentation for all interested, at two sessions, one at Oakland Civic Auditorium, Feb. 26, the other Scottish Rite auditorium, San Francisco March 1, staged by General Electric Lamp department illuminating engineers from Nela Park, headed by E. A. Linsday. There will be three sessions during the day, 10 a.m., 1:30 and 3:30 p.m. and a general session covering all phases in the evening session, 7:45-9:45 p.m.

ELECTRICAL WEST

Too Many Eggs in One Basket

BLAME for the continued power supply difficulties of the Pacific Northwest rest upon that region's long-time acceptance of federal paternalism according to a recent resource survey prepared by the 12th District Federal Reserve Bank. This dependance upon federal largesse has hampered the area's industrial development and has accounted for the chronic complaints of power shortages. Without reviewing the causes, which are well known to those familiar with the problems of the region, here are some of the consequences pointed out in the survey:

"Dependance upon Congress to maintain the scheduled rate of construction of new dams and provide the necessary additional generators and high-voltage transmission lines exposes the area to uncertainties and delay over and above those normally associated with purely commercial undertakings. Policy controversies can easily involve one or another of the far-flung federal power projects and throw the orderly development of the whole integrated system out of gear. This is part of the price which must be paid for local benefits provided from national funds.

"Another consequence of making federal authority rather than local initiative responsible for the development of Northwest power resources is the surrender of a large measure of control over marketing policies in the disposal of available energy. Almost of necessity the federal system has had to give priority to national defense considerations and other public objectives. This means, for example, long-time contracts with the electrometallurgical industries, such as aluminum production, which requires enormous quantities of low-cost power in order to exist at all . . .

"All this tends to limit rather drastically the supply of power available for sale to miscellaneous users and has operated to tie the hands of the various public utility managements of the area in building additional loads on their various systems and in bidding for new industries. Many potential industrial customers have had to be turned away. It is in this sense that a power shortage may be said to exist in the Northwest. Such a large proportion of all the eggs is in one basket—the defense industries — that relatively little is left over to be divided up among all other claimants, existing and potential."

Many students of the power industry have contended that the Northwest would rue the day that it placed all of its eggs in the federal government's power basket. The Federal Reserve Bank's survey confirms those opinions.

Call the Expediters

OUT of the morass of hopelessness attendant upon review of the President's "politics as usual" defense budget there is one solid piece of ground for the electrical industry. In urging the utmost haste for the development of his pet hydroelectric and river basin projects, the President pointed up the importance of adequate power supplies to the whole rearmament program. Hence there can no longer be any excuse for blocking immediate initiation of four or five non-federal Northwest projects which have long been deferred because utilities were unable to secure licenses or other clearances.

Just the other day, Sol Schultz, chief engineer of BPA, stated that six non-federal projects could provide the Northwest with more than 500,000 kw. of badly needed firm power by the end of 1952. They include Cabinet Gorge, Pelton, Box Canyon, Rock Island, Cowlitz and Copco. Of the group, only Cabinet Gorge has been licensed. The remainder are held up for one reason or another.

Immediate development of these projects, it would appear, might eliminate the necessity for additional federal expenditures and cut the fantastic budget by a few millions.

EDITORIAL VIEWS

In that way some non-essentials might be eliminated from the budget.

The various government agencies involved might well expedite the permits and insure the issuance of material and equipment priorities so that this power can be made available for defense purposes. As pointed out on these pages, the Northwest needs the energy.

War Is The Customer Again

A substantial electrical contractor, one who has the facts and figures of his business well in hand, observed that the contracting business was being saved from a decline that had started early last year by the new mobilization for defense or war. Not being in residential building, but commercial and industrial, he could say that, because the contractor whose livelihood depends on private home construction faces a very difficult future. On the other hand, there are already a large number of big projects and many conversion and modernization jobs on which the contractors of size and large staff will be busy.

But the significance of his remark is worth pondering. He began by saying that for the past ten years preparation for war, war itself, rebuilding or conversion after war, had been responsible for the volume of business his firm had enjoyed. Only last year, as this war-made construction began to taper off and the electrical contracting business more and more had to rely on civilian business, was a return to a realistic or normal situation to be seen. Even that was weighted with much public works construction, such as new schools and building for local governmental agencies.

So long as the artificial stimulant to construction lasted, there was little need for selling or creative effort in order to get contracts and employ all the men that were available, at whatever wages they demanded. But when ordinary business men with small businesses, and householders with electrical improvements in mind, came up against the inflated scales of wages and contractor operating costs spawned and nurtured by war, they backed away. Business was beginning to be hard to get. Contractors unused to selling their services, in desperation for volume to support their organizations and overhead, indulged in the self-delusion of at-cost or below-cost bidding. Competition was said to be "rugged."

It was in recognition of this dangerous trend in the contracting business that National Electrical Contractors Assn. instituted its business promotion and a research management training program. For the first time in years contractors gave heed to it. Before that, fat with war work at their own price, although they griped about wage increases and rising costs, they passed them on to the one big customer, the government, to pay, either directly or indirectly.

Now comes another war-sponsored boom in certain classes of construction—although a depression for the small contractor. May all the lessons just learned not be lost.

You Can Say That Again

IN discussions of the capitalistic system, those who stress sharing the wealth forget the importance of creating the wealth. You can't share if you have not created. It seems to me, too, that in the preservation of the enterprise system there has recently grown up the philosophy of "survival of the sickest" instead of "survival of the fittest." In the many investigations which take place in our country, it is almost always true that a successful company or a successful enterprise is the subject of suspicion and investigation. I wish they would start investigating the failures instead of the successes. This might result in some very interesting economic information. — Brig. Gen. David Sarnoff, chairman, Radio Corporation of America.

Quick Catch-up

Electric Clubs

F. Earl Webb, Webb Electric Co., Portland, was installed as president of the Electric Club of Oregon for 1951, in a simple ceremony at the regular club meeting Jan. 1. Installing officer was Berkeley Snow, Northwest Electric Light & Power Assn., a past president of the club.

Other officers installed at the same time were: first vice-president, Max O. Taylor, *The Oregonian;* second vice-president, R. B. Temple, General Electric Co.; executive secretary, L. A. Kallen; treasurer, W. H. Hayden, Portland General Electric Co.; sergeant-at-arms, George R. Schulz, Garland Affolter Engineering Corp., and executive committeemen, J. Dan Webster, Pacific Power & Light Co.; James G. Kirwan, Westinghouse Electric Corp., and past president, Logan C. Stewart, Bonneville Power Administration.

President Webb announced the following committee chairmen for 1951: resolutions, Grant R. Kelly, G. Pettingill and Associates; reception, Joe G. Galareneau, Packard Malloy Inc.; publicity, James H. Goggin, Portland General Electric Co.; program, Fred A. Waker, Crouse Hinds Co.; legislative, Berkeley Snow; golf, Paul Norstrom, General Electric Supply Corp.; attendance, Arnold McLaren, Line Material Co.; historian, Francis H. Murphy, consulting engineer; constitution and bylaws, M. D. Hiltibrand, Westinghouse Lamp Division; directory, Willard E. Wilson, McCann-Erickson Inc.; civic, R. E. Sinclair, Pacific Power & Light Co.; membership, John Reine, Graybar Electric Co.; entertainment, Harry Stengel, Bonneville Power Administration.

Reports at the installation meeting indicated the club was entering its 22nd year with 420 members.

NWEL&P

The Personnel Section of the Northwest Electric Light & Power Assn. will hold its annual spring meeting at the Davenport Hotel, Spokane, May 16-18, according to announcement by J. L. Stirn, Washington Water Power Co., section chairman.

The program will take up accident prevention and safety and personnel problems, with about one-third of the time devoted to the safety section. Principal subjects to be considered by the personnel group will be to bring statistical information on fringe issues up to date, with Herald Campbell, Pacific Power & Light Co., chairman, analysis of collective bargaining agreements, with Peter Piper, Washington Water Power Co., as discussion leader and training and employee information, with L. B. Jack, B. C. Electric Co., as discussion leader. Russell James, Portland General Electric Co., will conduct a half-day clinic on general personnel problems.

The meeting will include the customary luncheons with speakers on subjects pertinent to personnel matters, and possibly a banquet with a speaker of national note.

NECA

Outstanding apprentices for the past two years were honored at a banquet in Portland in the Oregon-Columbia Chapter, NECA, offices recently. In the group were representatives of the entire industry, including NECA members, IBEW officers, representatives of the Oregon State Apprenticeship Council, of the school, the utilities and the electrical inspection departments of both the city and state. Stan Adams, chairman of the NECA apprenticeship committee, presided and introduced John Clothier, president of local union 48, IBEW, who made the award of two engraved wrist watches to the apprentices for 1949 and 1950, Paul Luedtke, 1949, and Arthur Smith, 1950. Both achieved a nearly perfect score on scholastic record at the Portland Apprenticeship school, and they were rated highest in cooperation, ability, character and attitude. Brief talks were made by all persons present, and time was given to suggestions for improvements of the apprenticeship program. The meeting was considered a splendid indication of management and labor working together, according to Laurence C. Rodgers, manager of the NECA chapter.

Officers of the Northern California Chapter, NECA, were all re-elected for another year at the annual meeting of its board of directors in December, thus returning W. A. Goulart, of Richmond, as president; W. S. Bassett, Oakland, vice-president; C. D. Bronson, governor, and W. A. Cyr, secretary-treasurer. Elections were subsequently held for officers of the two branches. Paul Pease was named chairman of the Contra Costa branch; G. L. VanDeventer, vice-chairman; Vic C. Perero, secretary-treasurer, and Jack Crabbe, Ben Freeberg and Frank Brown, directors. Alameda branch officers were not selected yet.

Wage scales in both Alameda and Contra Costa counties went up automatically Jan. 1 in accordance with the agreement signed last July. Journeyman scale went to $2.60 an hour plus 4% vacation allowance.

Manager E. G. Kramm of the chapter has been asked to act as chairman of a committee seeking to get agreement among the various municipalities and the two counties on a uniform electrical code for the entire East Bay region. A meeting Jan. 15 considered two proposed versions.

Stanley Ingram, secretary-manager of the East Central California Chapter, NECA, announced the new officers elected and installed at the Jan. 18 meeting. President is Frank S. Caglia, Electric Motor Shop, Fresno; vice-president is William Pollock, Fresno Electric Co.; treasurer, Fred Hornig, Sierra Electric, Fresno; governor, William E. Ochinero, Acme Electric Co., Fresno. Directors are: Tom Robinson; L. G. Jeffrey, Jeffrey Electric Construction Co., Fresno; Ray Colby, Colby Electric; George Appling, Industrial Service Co.; Bert Demmon, Demmon Electric, all of Fresno, and Otto Luhdorff, Luhdorff Electric Shop, Visalia. Ingram says the weekly news letter, started by him in 1950, includes a list of jobs on which sub-bids are wanted. A material and equipment exchange which endeavors to aid members in rentals of equipment, purchase or sale of material will be continued during the new year. At the December meeting Frank B. Dickey, Anaconda Wire & Cable Co., spoke on the "Power Up" program, which the chapter is considering undertaking.

Sacramento Valley Chapter, NECA, moved up its officers a step each and inaugurated them at the first annual dinner dance it had ever had, Jan. 9, at El Rancho, Sacramento. James Mapes, Mapes Electric Co., turned over his office as president to J. E. Newmarsh, who had been vice-president, and became a member of the board of directors. Frank Merwin, Merwin & Gatejen, continued as governor. Lewis Stein, who had been secretary, became vice-president; W. E. Cotter, treasurer, advanced to secretary and Paul Benge became treasurer. Other directors are John Decker, Merwin and Mapes. The chapter is home chapter of J. D. O'Connor, vice-president for District 6 of NECA. William Welsh is chapter manager.

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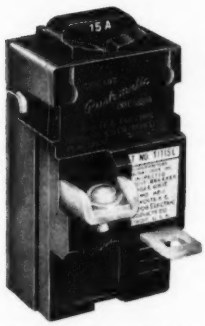

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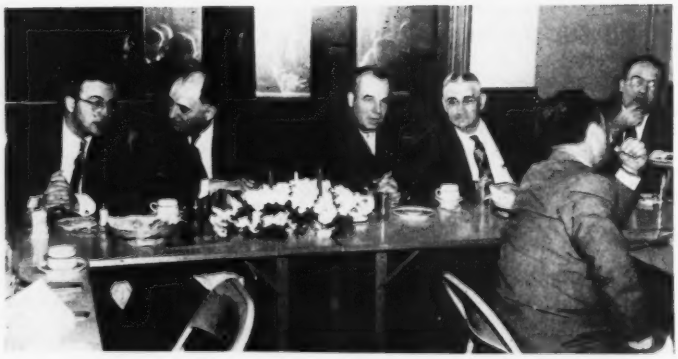
Among NECA Chapters

Joint apprenticeship group of Oregon-Columbia Chapter, honoring outstanding apprentices. Seated, left to right, H. H. Harrison, business manager, Local 48, IBEW; Gene Heiss, international representative, IBEW; John Clothier, president Local 48; S. S. Adams, chairman NECA apprenticeship committee; Paul Ludke, outstanding apprentice 1949; Arthur Smith, outstanding apprentice 1950. Standing, Doug Ellis, representative of Oregon State Apprenticeship Council; Cleve Moore, IBEW member on the council; Ralph Milsap, representing Portland General Electric Co. on the council; Ray Miller, instructor at apprenticeship school; Larry Rodgers, manager, Oregon-Columbia Chapter; Clarence Emmons, city electrical inspector and instructor; Oliver T. Fugitt, city inspector and instructor; Leonard Prince, contractor member of council; Virgil Scott, instructor; Ray Ferguson, assistant business manager, Local 48; J. Dan Webster, Pacific Power & Light Co. representative on council and its secretary; Norm Nilsen, director of Oregon Apprenticeship Council; William Graham, contractor member of council, and William Volheye, chief electrical inspector of the State of Oregon (see page 130 for more details)

Answering questions about the "Power Up and Be Prepared" program which he had just presented were Anaconda's Lee Hayward, left, standing, and William Kennedy, president of San Francisco Electrical Contractor's Assn., standing, right. Others are William J. Varley, manager; A. E. Holmsten; Bert Doherty, director; Ed Scott, secretary; Roy Moser, director, and George Abbett, past president. At the January meeting of the San Francisco association all of its officers were re-elected for another year. They are W. T. Kennedy, president; Rod Newman, vice-president; Edward W. Scott, secretary; Emil J. Weber, treasurer, and P. J. Furlong, L. Ets-Hokin, L. S. Malm, B. J. Doherty, F. W. Schultz, L. Roy Moser, E. O. Kleinhans, directors



New officers of the Sacramento Valley Chapter are W. E. Cotter, Reliable Elevator Co., secretary; Frank Merwin, Governor; J. E. Newmarsh, president, and Lewis Stein, vice-president. Manager, not shown, is William Welsh, seen in the picture below

At a recent San Joaquin County Chapter banquet at head table were Matt Sherwood, director Western regional office of NECA; J. D. O'Connor, District 6 vice-president, Sacramento; Gene McCarty, chapter president; Ed Grogan, chapter manager, and Bill Welsh, Secramento Valley Chapter manager and secretary of the California Conference of NECA chapters

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NECA

Matt Sherwood, director of the Western office of NECA, and new field representative for Districts 6 and 8, George A. Harter

Two men with considerable contracting experience now head the field work of National Electrical Contractors Assn. in the West. Both are on a swing of Mountain and Northwest states, meeting with the chapters and small groups of contractor members in Salt Lake City, Denver, Cheyenne, Billings, Great Falls, Butte, Spokane, Seattle and Portland before returning to their headquarters in San Francisco. Matt J. Sherwood, field director of the Western Regional Office, NECA, is taking George A. Harter, newly appointed field representative, with him to acquaint members with him as he will be contacting them in field work in the future.

Sherwood's experience began as commercial and industrial lighting consultant for Pacific Gas and Electric Co., from which he became estimator and superintendent for various electrical contractors for nine years, including such firms as Scott-Buttner, Pacific Electrical & Mechanical, Ets-Hokin & Galvan. He worked for Kaiser Engineers for two years on the design of lighting and power for Fontana steel mill. He was recently president of the East Bay Electrical Estimators Assn. During the past year he was field representative with E. R. Cornish, then NECA Western field director.

George A. Harter, the field representative just appointed, for the past eight years has supervised construction, done estimating, engineering and since 1947 has managed a branch of Charles A. Langlais Co. in San Jose, handling many large installations. He was recently president of the Santa Clara-San Benito Counties Electrical Contractors Assn., having served earlier on its code and labor relations committees and he initiated an area-wide Adequate Wiring program. Trained in electronics and gyroscopics he supervised many installations for the Navy in the Bay area during the last war and taught electricity and supervisory training for the University of California war training program.

Inspectors

Indicating the growth of electrical usage in the home, the Electrical Inspectors Assn. of B. C. heard N. S. Clark, superintendent of B.C. Electric Co. meter shop, present information about the new 200-amp. meter and base, which has come as a result of a growing demand for a meter larger than 100 amp. without requirement for current coils. This presentation was made to the inspectors before the new sequence meter was made available to the public. In its promotional efforts on adequate wiring in British Columbia the Electrical Service League has advocated the 100-amp. service installation as a minimum. Many new homes require a 200-amp. service. L. Robson presided over this Jan. 8 meeting.

Idaho Chapter, IAEI, has been having a busy series of code discussion meetings as H. W. Rising, state electrical inspector, has met with contractors and inspectors in Shoshone, Idaho Falls, Rexberg, Pocatello, Burley and Nampa during December, and Gooding, Idaho Falls, Rexberg, Pocatello and Burley in January. Local divisions of the chapter also met in Boise, Weiser, Twin Falls in December. Scheduled were meetings of the Boise Valley division at Boise, Jan. 11; South Central Division, Twin Falls, Jan. 18, and the Tri-County Division, at Weiser, Jan. 24. The latter would be the annual meeting with election of officers.

Utah Chapter heard its past president L. John Christensen review the past year's electrical fires and accidents as reported from the local newspapers at the Jan. 8 meeting. Overheated motors were the cause of 44% of fires from electrical causes, faulty wiring 19%, misuse of cords 17%. At this meeting L. B. Johnson, General Electric Co., was appointed chairman for the annual meeting sometime in April.

Puget Sound Chapter, IAEI, had its next meeting scheduled for March 3, at Olympia . . . Sacramento Valley Chapter had meetings scheduled for both Feb. 5 and March 5. . . . Central California Chapter is to meet Feb. 3 in Fresno.

IEA

With its annual meeting scheduled for Jan. 22 in Salt Lake City, the Intermountain Electrical Assn. was to hear a report on the year's program by Retiring President James L. Schricker, General Electric Co. New officers were also to be announced and the program for 1951 discussed by Manager Ray Halverson. During the past month IEA held meetings in Ogden, Price and Logan at which Brig. Gen. Frank Ritter talked on "Traitors of America." In February a meeting to install new officers will be held in all chapters.

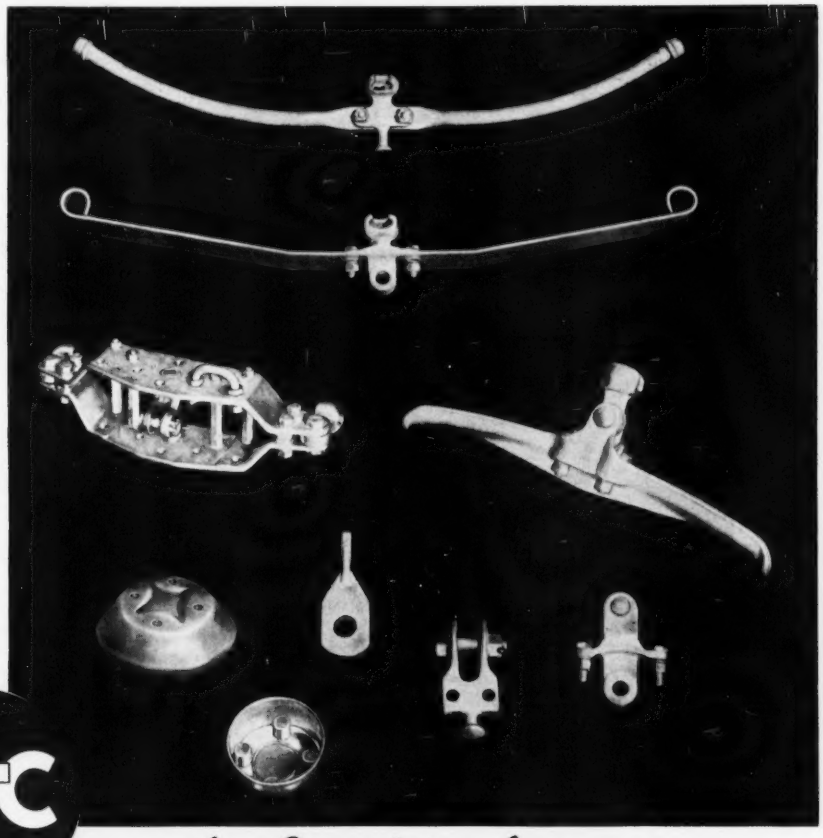
Glen L. Logan, new managing director of the Electric League of Los Angeles

IEEDA

Inland Empire Electrical Dealers Assn. chapters elected officers for the new year, recently, as did the association itself. Stanley Densow, Spokane dealer with four stores, long a worker in the IEEDA, was elected president; Harley Steiner, Steiner Radio & Electric, Lewiston, vice-president; F. A. Tool, Washington Water Power Co., Spokane, secretary, and Charles Nelson, Columbia Electric & Mfg. Co., Spokane, treasurer. Robert L. Wilkinson is executive secretary.

Big Bend Chapter elected Robert Hopp, Davenport Paint & Electric, president; C. D. Ewing, Ewing Truck & Tractor Co., Sprague, vice-president; Chet Lewis, Washington Water Power Co., Davenport, secretary, and as directors, Fred Denson, Winn Self, W. E. Snyder and Ted Bonk.

Spokane Chapter elected Densow its president also; Lester Barnes, Maxwell's Inc., vice-president; F. A. Tool, secretary; J. F. Boothe, Brown-Johnston Co., governor at large, and directors, A. E. Brown, Robert Guertin, and E. S. Bergquist.



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All models fit 3¼" or 4" or Gem X outlet boxes. The bases of 1795 and 1805 measure 5½" x 5". Those of 1715 and 1775 measure 6" x 4⅝". Copper screw shells are cadmium plated. Convenience outlets equipped with double-wipe contacts. Rating: Pull Chain: 250W-250V; Keyless: 660W-250V; Outlet: 15A-125V or 10A-250V.

MODELS AVAILABLE
1775, 1715, 1795, 1805 — Pull Chain with Convenience Outlet
1776, 1716, 1796, 1806 — Keyless with Convenience Outlet
1777, 1717, 1797, 1807 — Pull Chain no Outlet
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EMEA

"Electronic Regulators in Industry" was the subject of Victor B. Baker, Westinghouse Electric Corp., at the Jan. 17 meeting of the Electrical Maintenance Engineers Assn. of Southern California. Recently from the East Pittsburgh works, he told of applications to the paper, rubber, cement, steel and other industries with emphasis on maintenance of this type of equipment. The previous meeting had heard Harry A. Lott, Southern California Edison Co., tell of "Adequate Power for Present and Future Growth," describing the Western power pool.

IES

Oregon Section, IES, began the new year with a talk on "Selling America Today" with a Frigidaire movie presented by Jack Rawlings, sales promotion manager, Sunset Electric Co. Jerry Collins, Portland General Electric, was chairman of the day; Joseph G. Galarneau, Packard-Malloy Inc., presided.

Inland Empire Chapter, IES, Spokane, was scheduled to hear a discussion of surgery lighting at its January meeting. At its previous meeting Howard Stingle, superintendent of buildings and grounds, Spokane public schools, talked on "Classroom Lighting." As the host chapter to the Northwest Regional Conference, March 22-23, its plans are under way to program the meeting and handle the arrangements. Dave Parker, Columbia Electric & Mfg., is chairman of the committee.

A very successful lighting school was conducted by this chapter. It ran from September through to November, and had 125 registered for the first meeting; 105 paid up for the course and finished it. Registrants came from Wallace, Pullman, Coulee Dam, Ephrata and Ritzville, as well as the Spokane area to attend. The course covered an introduction to lighting, lamps and light sources (taught by Dave Parker); light control and materials, lighting systems, light measurements and meters and design fundamentals (taught by Fred Cooper, Westinghouse, Seattle); lighting for store and other mercandising areas (Hal Gardner, Columbia, Seattle); industrial applications, exterior applications (Charles Long, Westinghouse Lamp Div., Los Angeles); lighting for offices and schools (F. C. Henkel, Wakefield, Portland) and a final review of fundamental illumination design (Parker). The chapter is considering holding another similar course this year.

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What accounts for its widespread popularity? Simply this. Its proven ability to provide a better means of disconnecting high voltage circuits.

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THREE

ELECTRICAL ENGINEERS EQUIPMENT CO.

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THE MONTH IN BRIEF

Bill Asks Vote on PUD Acquisition

Approval of Spokane voters would be required for any purchase of Washington Water Power Co. properties in the city by a PUD, under a bill introduced in the Washington state legislature. The bill provides that no PUD or group of PUDs may acquire, directly or indirectly, an interest in electric distribution properties located in a first class city not within a public utility district. It applies only to cities of more than 100,000 and less than 200,000 pupulation, and Spokane is the only Washington city to fall within that classification.

Out-of-State Sales Would Be Banned

A bill banning sale of utility properties in Idaho to any governmental or quasi-governmental agency or instrumentality outside the state was passed by the Idaho legislature and signed by Governor Len Jordan. It was passed after less than 15 minutes debate in the house by a vote of 47 to 7 and in the senate by a vote of 37 to 3. Spokesmen for the bill said it would prevent Washington Water Power from selling any of its installations in north Idaho to Washington PUDs and thus removing them from the tax rolls. Suspension of the rules to jam the bill through was justified on ground that an emergency situation existed that might cost the state nearly $500,000 in tax revenues.

Proposal Would Clear Way for Dams

The 1951 Washington state legislature has been asked to reverse the action of the 1949 legislature in declaring the Cowlitz River a fish sanctuary, an action that has blocked proposed hydro development of the city of Tacoma.

Montana Clears Way for Cabinet Gorge

Enabling legislation for construction by Washington Water Power Co. of the Cabinet Gorge Dam in Idaho has been signed into law by Gov. John W. Bonner of Montana. The bill permits backing up into Montana the waters of the Clark Fork River from the proposed dam site, one mile from the western Montana border.

REA Jurisdictional Bill Stymied

Legislation designed to remove REA cooperatives in California from jurisdiction of the state public utilities commission apparently were stymied in the assembly public utilities committee late last month. The committee refused to vote the bill out to the assembly floor, referring it into a subcommittee for further study, and the bill's supporters gave it little chance to clear. The state senate earlier passed the bill as an urgency measure without a dissenting vote. The state commission recently declared the Sierra-Plumas REA co-op a public utility and so under its jurisdiction and in another recent decision gave one of the co-op's customers permission to transfer its business to PG and E. About two years ago the Mesa Electric Cooperative in San Diego County was ruled under state commission control and subsequently was refused further REA support. Meanwhile the Sierra-Plumas co-op plans to take the jurisdictional decision to the California courts, its application for rehearing having been refused by the commission.

Representation Asked at Rate Hearings

A bill requiring the state attorney general to represent the public's interest at utility rate increase hearings before the state PUC has been introduced in the California legislature.

Tax May Be Extended to Cities

A Washington state law requiring PUDs to pay a tax equal to 5% of their income from the sale of power they generate and distribute and 2% on resale of purchased power would be extended to municipalities under a measure before the state legislature.

Bill Would Widen PUD Business

Another bill before the Washington state legislature would permit PUDs to acquire telephone company properties by condemnation. PUDs have disclaimed any intention of going into the telephone business, however.

Utility Ruled Not Under Federal Act

A federal court at Phoenix, Ariz., has ruled that Arizona Edison Co. is not subject to rates and accounting regulations of the Federal Utilities Act. The decision was based on grounds that the utility operates entirely within the state and so is not subject to FPC regulation. The FPC had contended that Arizona Edison was in interstate commerce through purchase of Colorado River generated power.

Recount Finished on Proposition C

Proposition C, providing for purchase of Puget Sound Power & Light Co. properties within Seattle city limits, voted on last November, carried by 724 votes, the recent recount showed. Final vote was 65,616 Yes; 64,892 No.

Money Asked for Central Valley-BPA Tie

Interconnection between USBR's Central Valley power system in California and Bonneville lines in southern Oregon highlights a $47 million program of new transmission line construction for which the bureau is seeking funds. The Bonneville-Central Valley tie would be a high-voltage line from Shasta Dam which would interconnect with BPA lines near Klamath Falls, Ore. Under the plan, dump power from the Columbia would move south during high-water and off-peak periods, while steam-generated power from Central Valley might be moved north. Cost of the line is estimated at $5,370,000 of which $1.7 million is being asked for fiscal 1952. Supported in earlier studies by FPC, BPA and Reclamation and proposed in December of Interior's Defense Power Administration, the plan has been received unfavorably in the Northwest. One spokesman—Gov. Arthur B. Langlie—stated the power would flow only one way, south, and that California later might expect the Northwest to furnish the water needed by the industries using the power.

FOR VERY LONG SPACING on light-traffic streets

optical assembly type VR

40 to 100 per cent greater visibility is what you get with General Electric's Type VR optical assembly as compared to the conventional lateral-bowl refractor type assembly. The VR is specifically designed for Comfortable Seeing with long spacings on residential and other light-traffic streets. It will amply meet A.S.A. practice with 125 to 175 foot spacing and the economical 4000 to 6000-lumen lamps.

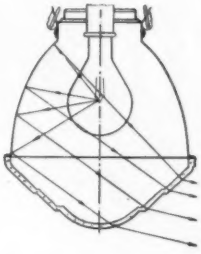
More Uniform Visibility The Holophane® Vertilateral® refractor of the VR optical assembly both lifts and turns the light into the street. This offers three main advantages—one, it gives a very accurate control of light for uniform distribution—two, directs maximum candlepower at a comparatively high angle for maximum silhouetting effect—and third, reduces veiling glare because light is directed from all parts of the refractor.

House-side Shielding Reflector design and curved prisms of the Holophane refractor turn light away from the house side and direct it up and down the street. Householder complaints are reduced, deflectors are eliminated—the basic design is correct.

Side or Center Mounting The VR assembly can be used for normal side-of-street mounting. However, it is ideally suited for center-of-street mounting where heavy foliage or parked cars, such as are frequently found in residential areas, make such mounting a practical necessity.

Type I Distribution The VR has I.E.S. type 1 distribution. No other luminaires are so ideally suited for so many light-traffic street applications. Get the facts on these luminaires—write for complete information to Section 452-113—or ask your local Apparatus Sales Office Lighting Specialist for application recommendations. Apparatus Department, General Electric Company, Schenectady 5, New York.

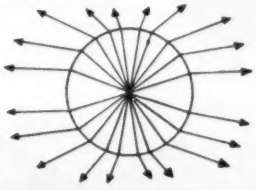
® T. M. Reg.



PRINCIPLE OF VERTILATERAL REFRACTOR

Vertical or lifting phase. Reflector directs light downward and REFRACTOR lifts and extends beam where required.

Lateral or turning phase. Curved prisms of the REFRACTOR shield the house side by turning light into the roadway.



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The VR assembly can be used in virtually any existing lighting system. It can be hung from any of the above hoods and insulators as well as most other types on the market.

Lamps—This assembly will operate any incandescent lamp from 2500- to 10,000-lumen with 7-in. L.C.

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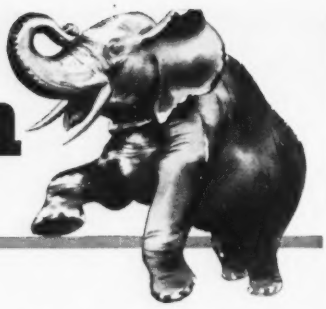

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Boxes

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THIS MONTH'S NEWS

UTILITY SIGNS USBR WHEELING CONTRACT

Public Service Co. of Colorado entered 1951 with a brand-new and untested contract to wheel electric power from the U. S. Bureau of Reclamation's generating plant at Green Mountain Dam, near Kremling (phase of the Big Thompson project), to "public bodies and cooperatives at agreed points on the company's lines."

The "public bodies," it was explained, means principally co-ops financed in whole or in part by the Rural Electrification Administration.

This ten-year commitment pioneers a field that has been only tentatively explored in a few areas where the federal government had constructed power sources in territory served by private utilities' distribution systems. So far as is known, the Montana-Dakota Utilities Co., Otter Trail Power Co., Northwestern Public Service Co. and Montana Power Co. are the only other electric concerns in the Rocky Mountain region with which the USBR has negotiated "wheeling" contracts. They vary in essential detail from the one into which PS of Colorado has entered.

Instead of the "postage stamp" contract—transmitting current to an entire area, regardless of distance from the receiving point—Public Service Co.'s deal provides for three zones: Zone 1 includes the area within a 50-mile radius from any point of intercommunication between the bureau and the company. Zone 2 extends the radius to 100 miles, and zone 3 to 150 miles. Compensation to the Colorado utility is 1 mill per kilowatt-hour within zone 1; .2c per kwh. in zone 2, and .3c per kwh. for zone 3.

A proviso for power lost in transmission is written into the document: in zone 1, 3% over and above the wheeled load requirement will be delivered by the bureau. In zone 2, 106% of the required quota will be delivered; zone 3 will get 109%.

The contract stipulates that Public Service Co. shall accept delivery of all electric energy generated by the Bureau of Reclamation's Colorado-Big Thompson River project into its transmission system at Greeley and Dillon, Colo., "for delivery to preference customers of the United States." Transmission voltage must be 44,000

SPECIFY DAY-BRITE WITH CONFIDENCE

INSTALL DAY-BRITE WITH CONFIDENCE

DAY-BRITE QUALITY MEANS NO WORRIES

IT HAPPENS INVARIABLY. You're uneasy about fixture "X." Its ballast is questionable. In several places, construction is skimpy. But, maybe—just maybe—this time you'll be lucky. You go ahead with fixture "X."

BUT, SURE ENOUGH . . . the temperamental fixture skyrockets installation time. Your profits dwindle to a whisper. Then, add an irate customer . . . time and money lost in call-backs . . . and you're fed up with the whole electrical business.

THE ANSWER IS DAY-BRITE. No worries. No doubts. Every inch of every Day-Brite fixture is engineered and constructed to deliver fast, simple installation, lowest-cost maintenance and quality performance.

KEEP YOUR PROFITS. Keep your customers. Keep your peace of mind. Specify and install Day-Brite with confidence. You can't make a sounder "better business" policy.

08

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Lighting Fixtures

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All-metal, shielded, for two 96" T-12 Slimline lamps . . . continuous or unit installations . . . suspension mounting only.

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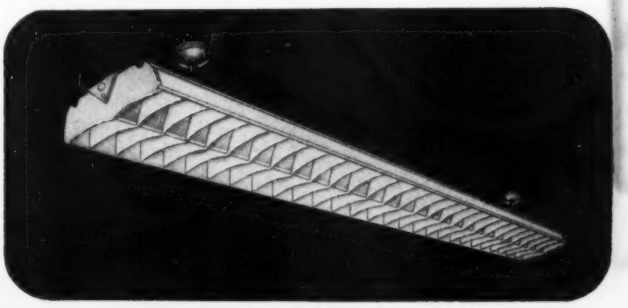

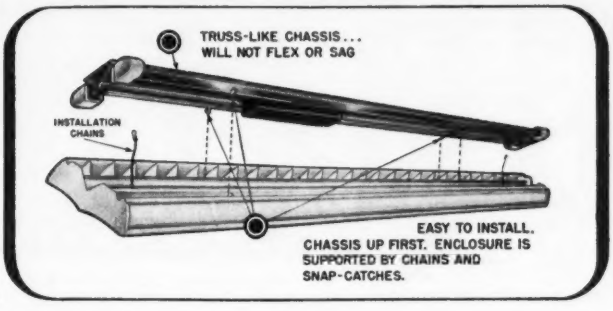
TRUSS-LIKE CHASSIS . . .
WILL NOT FLEX OR SAG
INSTALLATION CHAINS
EASY TO INSTALL.
CHASSIS UP FIRST. ENCLOSURE IS SUPPORTED BY CHAINS AND SNAP-CATCHES.

volts or higher with specific exception of "certain REA customers presently served at lower voltage."

In order to qualify as a "customer of the United States," recipients of USBR energy wheeled on Public Service lines must fall within one of the following categories: (1) Irrigation and drainage district pumping plants. (2) Those entitled to preference under governing law (the 1936 REA Act). (3) Customers engaged in the construction, operation and/or maintenance of hydraulic facilities of the United States. (Several more generating plants under the Big Thompson program are being built; those at St. Mary's lake and Estes Park are nearing completion. The company has been buying power from the Green Mountain plant to service these construction jobs; in the future, it will wheel this energy).

The contract was signed by A. A. Batson, regional USBR director, and John E. Loiseau, PS of Colorado president. It supplants the existing agreement which runs out Feb. 3, 1951, and does not disturb USBR rates applying to customers who will continue to pay as heretofore on a basis that includes "transmission cost component for transmission beyond major load centers."

Oscar L. Chapman, Secretary of the Interior, gave significance to the USBR-Public Service contract when he declared: "This is a cooperative agreement in which the statutory obligation of the federal government to give first preference in the sale of power to public bodies and cooperatives is fully recognized. It will permit all REA cooperatives now being served by the company and municipalities and other public bodies adjacent to the company's transmission lines to obtain Colorado-Big Thompson project power at a minimum cost to the consumer and the government."

Before the contract's terminal date in 1960, it is anticipated that additional substations will be built to service increasing loads generated by USBR plants, which will provide a continuous high-voltage grid extending from Oak Creek, in northwestern Colorado, to Holyoke, near the Nebraska line. Transmission lines to distribute power across this vast northern Colorado region are now under construction. The company is under obligation to wheel whatever additional energy the Colorado-Big Thompson project may develop.

Reclamation Commissioner Michael W. Straus expects that USBR power will be consumed, ultimately, within fifty miles of source, and thus come within the scope of a one-mill wheeling cost. He described these areas as those "in which all the energy produced by the project can be marketed."

Public Service Co. of Colorado spokesmen called the contract "a sound basis of cooperation between the company and bureau. It is in the public interest, providing for the fullest utilization of existing facilities, resulting in a minimum investment in transmission lines; at the same time enabling the bureau to fulfill its understood obligation under existing federal regulations of meeting requirements of customers entitled to preference."

● **In view of the national emergency,** preliminary steps have been taken to insure greater security at Grand Coulee Dam, the Bureau of Reclamation announced. An initial step, limitation of the general public to the entrance floor of the left power house, already has been taken. Previously, public tours were conducted to levels within the power house which now are regarded as restricted. The Vista House, tourist reception station, is to be left open under the current security restriction for the reception of visitors to the Coulee Dam, bureau officials said.

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Ten million fittings can't be wrong! That's how many Killark Die-Cast Alumalloy fittings are already in use. **First** in the field —they have already proved their worth to thousands of contractors in saving time, cutting losses due to breakage and damage, and in offering safer, more permanent installations.

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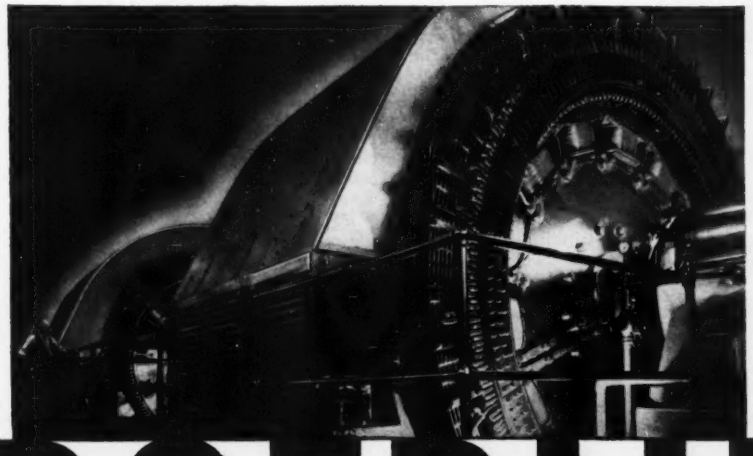
For outside covering you have a choice of braid, for service in dry locations; lead, for service in damp locations; and for aerial use or direct burial we recommend a protective armor such as steel tape or galvanized round wire armor.



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AGREEMENT INTEGRATES DAMS, UTILITY SYSTEM

A comprehensive agreement integrating operations of four federal power dams in southern Idaho with the Idaho Power Co. system has been approved by the company and Secretary of the Interior Oscar L. Chapman.

The new private-federal power contract provides that the company may purchase primary peaking, secondary and dump power and utilize unused storage capacity at Bureau of Reclamation reservoirs. Idaho Power will serve over its system federal customers designated by the government.

Bureau of Reclamation dams covered in the new contract are Black Canyon, Boise River Diversion, Minidoka and Anderson Ranch. They have a total installed capacity of 36,400 kw. Anderson Ranch, in addition, is scheduled to have two more 13,500-kw. units bringing it to a total of 40,500 kw.

Idaho Power will be paid for deliveries to federal customers on the basis of a three-part fee schedule: (1) one mill per kwh. for supplying loads west of Glens Ferry, Idaho; (2) 1.5 mills per kwh. for loads east of Glens Ferry, and an additional two to 2.3 mills per kwh. for services on less than 44-kv. facilities of the company.

The company will pay the government approximately $129,000 per year, subject to adjustment for actual power delivered by the government. Under the terms of the contract, Idaho Power will purchase: 3,500 kw. (roughly 6.25 million kwh. per year) of primary peaking power, with 1,500 kw. withdrawable, at a rate of six mills per kwh.; secondary power, estimated at about 28 million kwh. per annum, at 1.75 mills, and dump energy as available at one mill per kwh.

USBR, Montana Power Sign Transmission Service Pact

A new transmission service contract between Montana Power Co. and the Bureau of Reclamation was approved Jan. 12.

The company will deliver federal power from Fort Peck and Missouri River Basin projects to federal preference customers under a four-part transmission fee schedule. Similar arrangements for delivery of company power over federal lines are also provided in the contract. Transmission fees will be based on distances from delivery points. Fee for delivery in zone 1, within 50 miles of a delivery point, will be one mill; zone 2, 50-100 miles, 2 mills; zone 3, 100-150 miles, 3 mills, and zone 4, more than 150 miles, 4 mills.

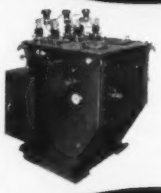
Delivery to federal customers will be made only at points on company transmission lines rated at 25 kv. or higher.

The new contract will remain in effect through 1960 and thereafter until terminated upon three years' notice, except that it will be automatically terminated after Dec. 31, 1970.

● **Bids** for four 6,000-kva. substation transformers with conversion equipment have been called by P. R. Hendricks, city purchasing agent of Seattle, Wash., for opening Feb. 13. The call is part of a program for expanding ten substations.

Pennsylvania TRANSFORMER CO.
INTRODUCES ITS NEW LINE OF

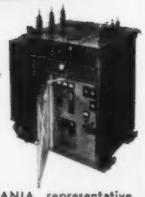
STEP VOLTAGE REGULATORS



20.8 Kva, 2400 Volts through 750 Kva, 13,800 Volts

UNIT SUBSTATIONS

1000 Kva through 3000 Kva, 12,000 Volts through 34,500 Volts Primary



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From pliers to pike poles, clamps to cable cars, tree trimmers to tamping bars—Graybar offers a complete range of tools for every line job. Every product distributed by Graybar is well known and approved by linemen . . . every product is designed specifically to help linemen do the best work with maximum safety.

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Stocks of hundreds of pole-line tools and equipment are maintained at Graybar warehouses in over one hundred cities. Often, prompt delivery from these local stocks saves valuable time. Your local Graybar Representative will be glad to give you information about tools or any of the 100,000 other electrical items distributed by Graybar. For special help on difficult problems, an experienced Graybar Outside Construction Specialist is at your service. *Graybar Electric Company, Executive offices: Graybar Building New York 17, N. Y.* 5066

IN OVER 100 PRINCIPAL CITIES

NORTHWEST COMPANIES PLAN DAM CONSTRUCTION

Spurred by defense needs, three Pacific Northwest privately owned power utilities have announced plans for dam construction which would add some 420,000 kw. of generating capacity. The companies, their proposed projects and generation:

Portland General Electric Co., Pelton Dam on Deschutes River in north central Oregon, 120,000 kw.

Pacific Power & Light Co., Yale Dam on Lewis River in southwestern Washington, 100,000 kw.

Washington Water Power Co., Cabinet Gorge project on Clark Fork River in northern Idaho, 200,000 kw.

Applications for federal permits have been filed at Washington on all three projects.

Of the three only the Pelton project faces serious opposition from fishing interests, which are opposing dam construction at all points where they interfere with salmon runs. Original plans for construction of this development by Pacific Northwest Supply Co., which was sponsored jointly by Portland General Electric, Pacific Power & Light and Washington Water Power Co., were blocked by the Oregon State Fish Commission.

In the revived project, Pacific Power & Light and Washington Water Power have dropped out and PGE will take over the assets of Pacific Northwest Supply, which, under original plans, would have divided its production between the three companies.

Approval by the Federal Power Commission, the State of Oregon and the U. S. Indian Service is required before construction can be started. The Indian Service is involved because of treaty rights at the dam site by Warm Springs Indians.

James H. Polhemus, PGE president, said his company will endeavor to work on an arrangement with the State Fish Commission before hearings on the project are held. Revision of plans for aiding fish life will include construction of a downstream reregulating dam to eliminate rapid stream flow as a protection to fish.

Site of the Pelton Dam is an 800-ft.-deep canyon. Height of the structure would be 200 ft. from foundation to crest, which would raise upstream river level about 150 ft. and create a lake eight miles long. Cost of the project is estimated at $20 million.

Pacific Power & Light's planned Yale project would be almost a duplicate of the company's Merwin Dam. The site is on the Lewis River, upstream from the 100,000-kw. Merwin development. Construction would be of the arch type, rising 285 ft. above the normal river level and 305 ft. above bedrock.

The Yale project would be the second step by PP&L in development of Lewis River's potential power production of 500,000 kw. Initial installation would be two 50,000-kw. generators, but with provision for two additional generators of the same capacity.

Paul B. McKee, PP&L president, explained that a third and fourth generator at both the Yale and Merwin projects will "follow further development of the river, including storage reservoirs farther up in the watershed." Cost of the Yale project is listed at $26 million initially.

No objection from fishing interests is expected, because provision is made in the Merwin Dam for capture and transplanting of migratory fish.

Washington Water Power plans to have three generators of 50,000-kw. capacity each at its Cabinet Gorge project in operation by 1952, with a fourth unit of the same capacity to be added in the near future.

Canadian Company Will Extend Transmission Lines

Involving an expenditure of $3,000,000, the Consolidated Mining and Smelting Co. of Canada will start an extension of its transmission lines from its plants on the Kootenay River, between Trail and Nelson, B. C. Power will be carried to the plants of the company at Kimberley in the East Kootenays.

The project involves construction of what is believed will be the longest overhead power line span in the world. This span will carry the 170,000-volt 75,000-kva. transmission line across the main Kootenay Lake from a point between Ainsworth and Coffee Creek to a point south of Riondel. This span will be approximately two miles in length. Special suspension equipment and cables will be required.

A branch line will also be built up the east shore of Kootenay Lake to provide power for the company's Bluebell Mine, which is now being brought into production.

The power line will proceed up Gray Creek over a 6,300-foot pass, down Redding Creek and the St. Mary's River and will terminate close to the Sullivan concentrator at Kimberley.

The power will be used for all the company's Kimberley operations, including the new fertilizer plant which will be built in the next two years.

FIRST STAGE CONTRACT LET ON ALBENI FALLS

Contract for first-stage construction of Albeni Falls Dam was let by the Corps of Engineers to the Macco Corp. of Paramount, Calif., on a bid of $519,500. Only 110 days are allowed for completion of the contract, which involves preliminary rock excavation for the spillway dam, clearing, widening and deepening of the North channel and construction and unwatering of upstream and downstream cofferdams.

The bid was awarded after the second opening of bids. Macco's bid on the first opening in December was $539,900. Government estimate was $509,824.

Second-stage construction bids have been called, with opening on about March 1. The contract includes construction of the spillway dam and cofferdam to take in the power house area.

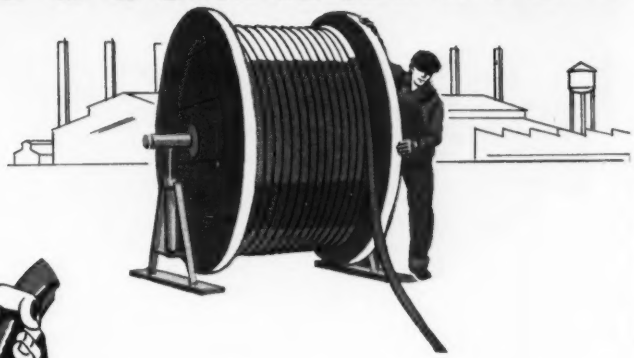
Ultimate cost of the dam is estimated at $31,070,000. Three 14,200-kw. units are planned. The Pend Oreille is an upstream tributary of the Columbia and the water storage at Albeni would firm up 208,000 kw. at plants on the main stem of the Columbia below the Albeni site.

● **Contract** for fabrication and installation of three 54,000-kw. hydroelectric generators in the Folsom power plant on the American River in the Central Valley project in California has been awarded by USBR to Westinghouse Electric Corp. on a bid of $2,713,030. The first generator must be installed within 1,060 days, the second in 1,150 days and the third in 1,240 days. Initial operation of the plant is set for June 1954, with the three units to be on the line before the end of 1954.

● **Westinghouse Electric** Corp., Spokane, submitted the lone bid of $44,018 to furnish a unit substation for the industrial area at Grand Coulee Dam. The figure was subject to escalation up to 10%. The unit substation would be used to provide energy for the power, lighting, and heating of the industrial area at the dam. Installation of the equipment will be done by government forces.

● **Allis-Chalmers** Mfg. Co. received a $183,830 contract from the City of Tacoma, Wash., for a 15,000-kva. unit substation. Allis-Chalmers' bid was $8,100 higher than the nearest competitor but it offered better delivery by 25 days, with a penalty payment should it be late.

Replacing Secondaries?



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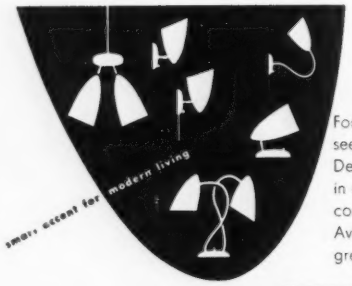

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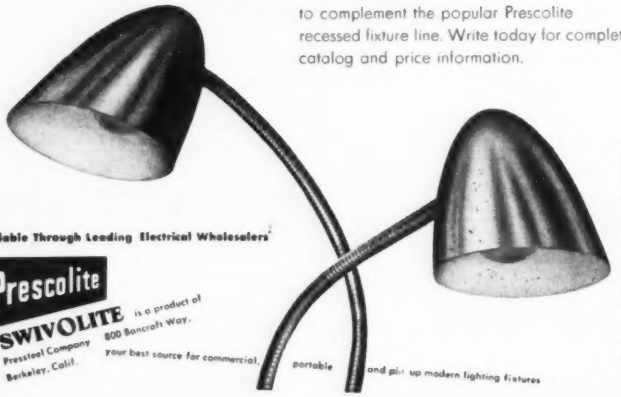

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CONTRACT DUE SOON ON MCNARY POWER HOUSE

The remainder of power house construction for McNary Dam on the Columbia River will be part of the largest single construction contract for the dam to be advertised in the early months of 1951.

The contract will include construction of the power house substructure for 12 main units, and superstructure for entire power house of 14 units and assembly bay. First two units are expected to be in service by December 1953, and each four months thereafter an additional 70,000-kw. generator will be put into use until 14-unit total of about one million kw. is completed.

Three years will be required to complete the work under this contract, which takes in construction of the remaining portions of the spillway, abutment embankments and appurtenant structures also.

Now being completed is the contract for construction of the superstructure for two power units, for the service unit which will furnish power to run the locks, and for the assembly bay.

● **General Electric** Co. is low bidder on a contract for furnishing electric equipment for McNary Dam on the Columbia River between the states of Washington and Oregon. It bid $290,-452 on Schedule A and $668,833 on Schedule B. The contract involves 14 circuit breakers, three air compressor assemblies, 14 sets of metal-clad generator grounding equipment, accessories, potential transformers, surge protective equipment, miscellaneous appurtenances, spare parts, etc. First delivery is scheduled by Dec. 1, 1952, and final delivery by March 1, 1956. Power is expected to come off the first two units by Dec. 1, 1953.

● **An instantaneous peak** of 1,937,-000 kw. reached at Grand Coulee Dam on Jan. 8 was claimed by the Bureau of Reclamation to be the greatest generation of hydroelectric current from one place in the history of the world. On the same day, the dam's power plant broke an hourly record for power production at 1,905,-000 kwh. at 6 p.m.

● **Northern Arizona Light & Power** Co. will construct an 80-mile, 115-kv. transmission line from Prescott to Flagstaff in northern Arizona. The new line will carry energy from Davis Dam. The power line from the dam already is installed to Prescott, but a substation remains to be constructed.

Lionel has satisfied itself that through Quinterra, they have a step-down transformer that is virtually harm-proof for their customers of all ages.

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Att: Mr. B. B. Woodford

September 29, 1949

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The Lionel Corporation has been using "Quinterra" as insulation between the primary and secondary windings of our toy transformers almost from the first day that this material was commercially available.

Due to its superior mechanical strength, its high insulating properties, and especially its resistance to charring even under burn-out tests, short circuits and leakage between the two windings have been entirely eliminated. The user of the transformer can now be assured of perfect safety from 110-volt shock even though through some mishap he has burned out the transformer.

It should be a source of gratification to the developers of this material to know that they have made an important contribution to the safety of electrical devices both large and small.

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Joseph L. Bonanno

Chief Engineer

jlb:nr
enc.

"Railroad" discovers *Quinterra* insulation adds new safety factor for customers

REPORT AFTER REPORT from users of Quinterra shows that this revolutionary, new Johns-Manville purified asbestos high-temperature electrical insulation is effecting major improvements in transformer design.

And more than that. These reports show that manufacturers are not only obtaining important sales advantages for their electrical products through the use of Quinterra . . . but they are also saving time and money in their manufacturing operations, as well!

This paper-thin, continuous sheet insulation is being widely used in transformers and coils. Its lasting dielectric strength, due to its resistance to pyrolysis (deterioration from heat), assures a greater safety factor and longer operating life. Quinterra withstands substantially higher temperatures than the hot-spot limit of 130C for Class B insulations.

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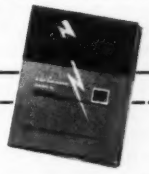

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EW-2

PROSPECTS FOR WATER ABOVE NORMAL IN N. W.

Water prospects for the Pacific Northwest this year are above normal, although slightly below those of last year, the Weather Bureau predicts in its first water forecast for the year.

The bureau predicts 87,000,000 acre-ft. for the Columbia River at Grand Coulee Dam in eastern Washington, as compared to 92,450,000 last year and a normal 71,500,000. Even should future precipitation be at a record low, the Columbia Basin is assured of 90% normal runoff on the basis of moisture to date, says the bureau.

Flow of the Skagit River at Concrete, below the Seattle hydroelectric development, is forecast at 11,200,000 acre-ft., as compared to an average of 10,140,000 acre-ft.

PUD Calls Bids for Rock Island Dam Expansion

Previously having called bids for six hydraulic turbines and two power transformers, the Chelan County PUD now has invited proposals for the furnishing of six generators and another transformer in its $26,000,000 program for the expansion of Rock Island Dam near Wenatchee, Wash. Puget Sound Power & Light Co. owner of the dam, has agreed to the PUD plan for increasing its capacity (EWEST, January, P. 94).

Figures for all equipment will be opened Feb. 19 at the Boston, Mass., office of the Stone & Webster Engineering Corp., which is planning the expansion.

The generators will be of the vertical water-wheel-driven, umbrella-type, 100 r.p.m., 13,800 volt, three phase, 60 cycle, having a continuous rated capacity of 25,000 kva., 90% power factor.

● **Third edition** of "I Want to Know About the Electric Industry," has been published by Edison Electric Institute. What about the electric industry in a national emergency? is one of the 27 questions answered in the booklet. Others have to do with sales, customers, appliances, farm electrification, revenues, steam vs. water power, etc.

● **On its second refinancing** in four months, the Cowlitz County PUD of Longview, Wash., has refinanced $5,884,000 worth of 1944 and 1946 bonds at an estimated saving of $264,409 over the next 23 years. The first refinancing saved an estimated $340,525, bringing total savings to $604,934. The new bonds were sold to Estabrook & Co. of Boston at an interest rate of 1.999056, as compared to interest rates ranging from 1¾ to 2.4% on the 1944 issue and 2.4 on the 1946 issue. A $2,400,000 issue was refinanced late last year at 2½% interest, as compared to a former rate of 3¼%.

California Commission Needs Associate Utilities Engineers

Associate utilities engineers are needed by the California State Public Utilities Commission to fill vacancies in San Francisco and Los Angeles. Three years' utilities engineering experience or with an allied industry or regulatory agency and college graduation with engineering major are minimum requirements. Registered engineers can file applications before March 3 to take civil service examination later that month. Work will consist of valuations, appraisals, rate regulation, service, safety of gas, electric, communications and water companies. Salary range is $415-$505 monthly. Candidates must be legal California residents, registered professional engineers or must obtain certificates before appointment. Information is available at State Personnel Board offices, 1015 L St., Sacramento; 305 State Bldg., Los Angeles, or 107 State Bldg., San Francisco.

● **Three hydraulic pumps** that are expected to aid salmon in passing McNary Dam on the Columbia River have been ordered by the Corps of Engineers from the Baldwin-Lima-Hamilton Corp. for $853,190. The pumps, each with a capacity of 2,500 c.f.s., will be used to agitate the water and create attractions at the entrances to the fish ladders so the fish may be induced to climb the ladders and thus bypass the dam, now under construction.

● **Pinal County farmers** in irrigated central Arizona are replacing 25-cycle pump motors with 60-cycle units. E. A. Moritz, director of the Bureau of Reclamation Region 3 has assured delivery of 60-cycle power by Feb. 1 when the heavy irrigation season begins. Power now is obtained from Indian Service lines and the Salt River Power District. By summer, the area will be served with power from Davis Dam through the Arizona Power Authority.

EIGHT OREGON TOWNS GIVE UTILITY FRANCHISES

Eight eastern Oregon municipalities have granted 20-year franchises to the California-Pacific Utilities Co. during the last few months, according to Elmer E. Kime, vice-president and divisional manager for the company. Seven franchises were for electric services and one for gas. The communities concerned were Burns, John Day, Prairie City, Hines, La Grande, Dayville, Mt. Vernon and Canyon City.

In addition to transmission line and substation expansion the company has carried through a record-breaking program of rural electrification. Total increase in rural customers for the last four years is 67%; total new customers is up 26½% and over-all household consumption of electricity is about 85% more than four years ago when the company acquired the eastern Oregon system.

● **California's** first recorded tornado ripped off about 100 ft. of wall at a turbine machine shop as part of some $200,000 worth of damage at Westinghouse's Sunnyvale plant. The entire plant was shut down for 24 hours after freak storm in mid-January, and one building, a metal fabricating shop, was out of commission for about a week. The twister also snapped distribution lines in its path in Sunnyvale and San Jose. Scattering of transmission troubles in the Pacific Gas and Electric Co. service area during the storm was caused not by wind but by lightning—also unusual in California.

● **Possibility of a hydroelectric** development in connection with the new Capilano water dam of the Greater Vancouver Water Board was introduced for consideration of the city council at Vancouver, B. C., recently. On a council resolution the board will be asked to investigate the possibility of a development of sufficient power to use for street lighting in the municipalities served with water by the board.

● **REA** has approved the Sacramento Municipal Utility District's application for a $3,925,000 loan to finance construction of rural electric lines and substations within the area. The district has been in operation for about four years, and during that period about 15,000 new homes have been connected in rural areas. During the next two years, the district expects to add 8,650 new rural customers.

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LOOK FOR THE 19TH EDITION—APRIL 1951

Published annually as a supplement to the April issue by

ELECTRICAL WEST

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● **The third annual convention and engineers' show** of the California Society of Professional Engineers was held at Hotel Whitcomb, San Francisco, Jan. 18-20. Attendance exceeded 1,000. The affair was highlighted by a luncheon, cocktail party and annual banquet. Principal speakers were: Col. D. H. Gregg, 6th Army Engineers, spoke on army engineering and the professional engineer, and Rear Admiral A. G. Cook, who spoke on civilian defense preparedness and the engineer's part in this program. At the banquet, S. L. Stolte, president, National Society of Professional Engineers, discussed professional recognition of the engineer. Ken D. Harrington of Cutler Hammer, Los Angeles, was elected president of the California Society and Arthur C. Bullen Jr. of Del Rosa, secretary.

● **Construction** has begun at Tacoma, Wash., on the first unit of a $5,000,000 electrical equipment plant for the Pacific Oerlikon Co., a subsidiary of the Oerlikon firm in Switzerland. The first unit, involving a reported investment of $1,000,000, consists of a 50,000-sq. ft. building to house the switchgear (circuit breaker) shop. It is expected to employ 100 men when it goes into operation. Ultimate employment of the completed $5,000,000 plant is placed at 800. The Tacoma operation is the company's first manufacturing venture in America.

● **A 30-minute educational movie** showing development of the Salt River Valley project and reclamation in the West has been produced by the Salt River Valley Water Users Assn. Dick Searles, association president, said the movie will be distributed to schools and civic organizations as an educational service.

● **With the Columbia River** 6 ft. above its 15-year average for early January, construction operations at Chief Joseph Dam were virtually halted in January. The high water made it impossible to install current deflectors for driving steel sheet piling for the cofferdam.

● **Clallam County PUD** of Port Angeles, Wash., has accepted an offer of the Pacific Northwest Co., Seattle, to refinance $87,000 in outstanding water bonds. Interest will be reduced from 3.7 to 2.59% effecting a saving of about $5,000 over a 19-year period, according to Manager S. A. Payette.

NEWS ABOUT PEOPLE

● **Election** of **W. L. Chadwick** and **J. F. Davenport** as vice-presidents of Southern California Edison Co. was announced Jan. 19 by President W. C. Mullendore. Chadwick, manager of engineering since 1945, was elected vice-president in charge of engineering and construction. He joined the company in 1922 as a draftsman at the Edison Big Creek hydroelectric project. He became division engineer there in 1924, and went to the general office in Los Angeles in 1928 as transmission engineer. From 1931 to 1937 Chadwick was engineer and senior engineer, Metropolitan Water District. He rejoined Edison in 1937 as a civil engineer and served as chief civil engineer until his appointment as manager of engineering. Davenport has been associated with the company since 1926. In 1929 he became hydro engineer, and in 1931 was appointed superintendent of hydroelectric generation for the company. He was named superintendent of generation in 1937, and assistant manager of operation in 1940. Following more than four years of military service with the Air Corps in the fields of communication, radar and the U. S. strategic bombing survey, Davenport returned to the Edison company as assistant vice-president in February 1946.

● **William Batchelor** has been appointed manager of the General Electric Co.'s hand iron factory in Ontario, Calif. He succeeds **William H. Tangeman,** who has retired after 16 years in that position. Batchelor joined General Electric at Ontario in 1915 as a buffer. Until 1928 he was in the production section, then was transferred to the sales office. In 1933 he returned to manufacturing work and 12 years later was appointed assistant works manager, the position he most recently held. Tangeman, who was recently honored by the Merchants and Manufacturers Assn. of Los Angeles as "the company executive who has demonstrated outstanding leadership in supervisory development," joined G-E at Ontario in 1914 following graduation from the University of Kansas.

● **Roy N. Vernstrom,** advertising manager for Pacific Power and Light Co., had been named Portland's first junior citizen of 1950. He has been with PP&L for three years.

LINEMAN ASH TRAY

A well-designed ash tray on which is mounted a life-like figure of a typical lineman is now being offered for sale by E. P. Taylor, of I.B.E.W. Local 18, Los Angeles. Mr. Taylor conceived the idea of having such figures prepared in order to present one, along with a diploma, to each apprentice lineman graduating from Local 18's training program. Other members suggested having the figure mounted on an ash tray to serve a more utilitarian purpose. The figure is about six inches in height, and both ash tray and figure are finished in bronze. The ash tray and lineman (as illustrated) sell for $3.95 plus sales tax, if any. The figure alone, mounted on a California Redwood base which carries a bronze plate (on which date of presentation, name of apprentice, etc., may be engraved), sells for the same price. Orders for the above-mentioned items should be accompanied by remittance and addressed to **E. P. Taylor, 4189 West Second Street, Los Angeles 4, California.**

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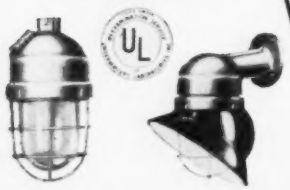

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The epic story of population and industry migration Westward rivals the gold rush migrations of 1849-50. Added to the already rich and stable market afforded by the region, they make the West the nation's preeminent market for electrical equipment, materials and appliances. These are the factors that warrant special SALES and ADVERTISING attention to this market. ELECTRICAL WEST blankets the market, completely and intensively and its value as a sales builder is attested by 247 advertisers who regularly use its pages to pave the way for their salesmen.

● **W. P. L'Hommedieu,** veteran of 40 years of service to the electric utility industry in the West, has been appointed assistant Pacific Coast District manager for the Westinghouse Electric Corp., headquartered in San Francisco. He will work with Walter J. Maytham, district manager. L'Hommedieu formerly was district manager of the company's Central Station division. Since 1939, he has been in charge of the sale of electrical apparatus to electric utility organizations in nine Western states, Alaska and Hawaii. A native of Bayshore, Long Island, he joined Westinghouse in 1906 at East Pittsburgh, Pa., shortly after completing electrical engineering studies at Pratt Institute, Brooklyn. He was transferred to San Francisco in 1910.

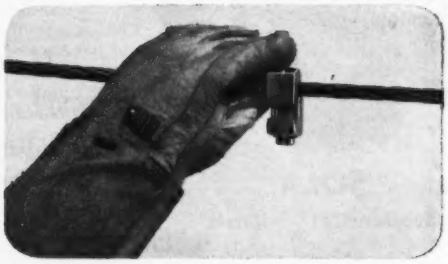
● **Frank E. Bodine** has been named manager of the Central Station division for the Pacific Coast District, Westinghouse Electric Corp. In his new assignment, Bodine will have charge of the sale of electrical apparatus to electric utility organizations throughout the district, comprising nine Western states, Alaska and Hawaii. He succeeds W. P. L'Hommedieu, who has been promoted to assistant district manager. Bodine has served as assistant district manager of the Central Station division for the past year. A native of Denver, Colo., he joined Westinghouse at East Pittsburgh, Pa., in 1926, shortly after receiving his electrical engineering degree from Colorado A & M College, Fort Collins, Colo.

● **Wade H. Taylor** has been appointed power manager of the Bureau of Reclamation's Region 3, succeeding **Roy V. Sprague** who retired July 1. Taylor will be in charge of the branch of power utilization, which has technical supervision over Hoover, Davis and Parker Dam power plants and their integrated transmission systems in California, Arizona and Nevada. Taylor received an M.S. degree in electrical engineering from the University of Colorado in 1935.

● **L. S. Lotheridge,** for 45 years with West Coast power systems, 30 of those years as a district manager for Southern California Edison Co., has retired. **L. S. Peterman**, director of power development for Edison in the Los Angeles area, will replace him. Lotheridge joined the old Ventura County Power Co. as a collector in 1906. He became agent of the Santa Paula, Calif., Edison district in 1914, and was appointed district manager six years later.

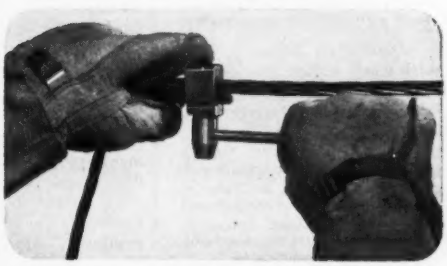
Simple as 1-2-3 to Install...

Hold Wires Permanently!



1st: HOOK ON RUN

2nd: INSERT TAP



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AVAILABLE IN ALL TYPES

Fargo vise-type connectors are available in lap, straight and diagonal jaw designs. Plated spacer bar types are recommended for dissimilar metal connections. There are also heavy-duty, two-bolt spacer bar types, with "one-piece" features, for transmission and heavy primary applications.

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SOLA

Sequenstart* Ballasts

keep your light output constant

within ±2½% regardless of line voltage fluctuations of ±15%.

what this means to you

Greatly varying electrical loads have made large line voltage fluctuations common. The patented SOLA Constant Wattage design of Sequenstart* Ballasts insures constant light conditions, builds user satisfaction and places fluorescent lighting on a new level of dependability.

compare SOLA with any other ballast

Here are the significant advantages of SOLA Sequenstarts* over conventional ballasts:

- Regulated light output through patented constant wattage design
- Cooler operation because of ventilated capacitor compartment
- Less wattage loss, lighter in weight and more compact with Sequenstart* circuit design.

We will be happy to answer any questions you have about ballast design and application. You are invited to write for the technical bulletin giving complete electrical and mechanical specifications of SOLA Constant Wattage Ballasts. Request Bulletin **29-PFL-144.**

Compare ballast performance — then specify the outstanding performer.

SOLA

Sequenstart*

Constant Wattage BALLASTS

SOLA ELECTRIC COMPANY

4633 West 16th Street

Chicago 50, Illinois

*Trademark

● **Noel B. Hinson,** Southern California Edison Co. vice-president and executive engineer, has retired after 44 years of continuous service. Since 1943, Hinson has been chairman of the Pacific Southwest Power Interchange Committee, a post which he will retain. Hinson joined Edison in 1906 as a testman in the Los Angeles test department, became distribution engineer in 1913, planning engineer in 1923, and was appointed chairman of the company's planning committee the same year. He initiated a system of analysis of population and load growth in relation to the company's system requirements—a method still in use. In 1928 he was named assistant manager of operation, and was promoted to chief engineer in 1934. Eight years later he became executive engineer and was elected a vice-president in 1945.

● **Harry A. Lott,** formerly chief of system planning, Southern California Edison Co., was appointed executive engineer, succeeding N. B. Hinson, retired. Lott's Edison company career dates from 1926 when he joined the organization as an assistant operator in the substation division. After serving as station chief at several Edison substations, he was appointed a dispatcher in 1929. He was appointed chief dispatcher the following year, and named operating engineer in 1937. In 1946, he became chief of electrical engineering, and was made chief of system planning in 1948.

● **C. A. Rost** has been appointed manager of North Pacific sales district of the General Electric Lamp department, according to Fred F. Harroff, department general manager. He succeeds Walter J. Pitblado who died suddenly, Dec. 7. Rost, a native of Portland, was graduated from the University of Montana with an A.B. degree. From 1931 to 1942 he was with the Montana Power Co. at Butte, engaging in sales and in general office activities. After three years with the Spokane Service Command, Rost joined the G-E Lamp department's North Pacific Sales district in 1945, as a resident salesman at Spokane. In July 1950, he transferred to the district's Portland office to do special work there.

● **Assistant Secretary of Interior C. Girard Davidson** has resigned to enter private law practice in Portland, where he was formerly associated with the BPA legal staff. Davidson was confirmed in the Interior post in June 1946.

JEFFRIES

TRANSFORMERS

BUILT TO ORDER IN A HURRY!!

When you are installing or re-arranging—and need a special transformer to exactly match your requirements call on us. We can deliver in a week to 10 days.

Specify scattered transformers to eliminate duplicate conduit runs and save on power costs.

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ABOLITE *Lighting*

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ELECTRIC EQUIPMENT CO.

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Explosion Proof Motors Headquarters

WESTERN REPRESENTATIVES

Your Eastern principals are entitled to free listing in the 1951 April Manufacturers' Directory. Check to be certain they have sent us listing showing Western Representatives and addresses.

Deaths

● **Wynn Meredith,** 86, engineer and partner in the San Francisco electrical engineering construction firm of Sanderson and Porter, died in Oakland on Dec. 21. A native of Illinois, he attended the University of Illinois college of engineering. He supervised the installation of Pacific Electric Railway Co. equipment in Los Angeles, and electric power systems in Vancouver and Victoria, B. C. In 1894 he came to San Francisco to handle electrical installations at the Mid-Winter Exposition.

● **Walter J. Pitblado,** North Pacific district sales manager for the G-E Lamp department, died suddenly in Portland Dec. 7. He had served the company for 30 years. In 1930 he was transferred from Cleveland to Portland, where he headed the lamp department's local service district. In 1949 he was made head of the North Pacific sales district.

● **William "Bill" Sadler,** electrical contractor, plumbing and hardware store proprietor in Redwood City for many years, died in late December.

● **Earl Seal,** who presented movies and made talks for the publicity department of Pacific Gas and Electric Co., died the Sunday before Christmas, of heart attack. He had written some articles for ELECTRICAL WEST at one time.

● **Jake Simon,** one time organizer of Kelvinator-Pacific, in Los Angeles, and later owner of Refrigeration Distributors, and manufacturer of Utility commercial refrigeration equipment, died, Dec. 23, aged 67. Illness had caused him to sell his business last spring, to Chapman Industries of Calif.

● **George Wallace Kable,** who addressed the Northwest Electric Light & Power Assn. Business Development Section meeting at Salt Lake City last year, editor of *Electricity on the Farm* magazine, for which he often toured the West, died in December.

● **Frank R. Sherwood,** manager of the purchases and stores department, Pacific Gas and Electric Co., since 1945 and long-time member of the organization, died at his home in Oakland on Dec. 31.

● **Meiron Davies,** 52, manager of the Amalgamated Electric Co. at Vancouver, B. C., died suddenly in Toronto recently.

magno-tronic
DUAL SILVER POINT — FULLY AUTOMATIC
FLUORESCENT STARTERS

—completely eliminate annoying blinking and flickering of dead fluorescent lamps!

GUARANTEED — FOR ONE YEAR!

This is a glow switch condenserless precision starter equipped with automatic thermal relay circuit breaker. The relay automatically removes the lamp from the circuit electrically when the lamp becomes deactivated and automatically resets upon interruption of the lamp circuit.

SIMPLIFIES—Replacement of defective lamp automatically recycles starter circuit. No buttons to push—no replacement of starter.

REDUCES COST—Magno-Tronic starters provide exact timing of electrode heating, preventing excessive loss of emission material, thus assuring maximum possible lamp life.

VERSATILE—Built to operate efficiently over an extended voltage and temperature range.

SP-15-20 For use with 15 or 20 watt lamps.
SP-30-40 For use with 30 or 40 watt lamps.
SP-85-100 For use with 100 watt lamps.

Manufactured under U. S. PATENTS

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EXTRA Holding Power
QUICKLY Installed
TOUGH For long life

EVERSTICK ANCHORS

For new construction and maintenance —Everstick Anchors speed up work and provide dependable anchorage on all types of jobs. Made of resilient, rust resistant malleable iron. The toughest anchors made. Write for bulletin.

EVERSTICK ANCHOR CO.
FAIRFIELD, IOWA

Mica Insulation Headquarters

Molding Mica — Flexible Mica
Segment Mica — Fiberglas and Mica
Heater Plate Mica

And all types of mica combination for your electrical requirements—sheet, tubes, and fabricated parts.

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Michigan 1907

SEATTLE 4
2406 First Ave. So.
ELiot 8061

DENVER 2
1015 Twenty first St.
MAin 4912

NOTES ON THE TRADE

More Power to America Train to Visit West

The "More Power to America Special," General Electric's 10-car exhibit train (EWEST, June 1950, p. 84), will visit 15 industrial centers in Arizona, California and Nevada during March and April, according to A. D. Bragg, Pacific district manager of the company's Apparatus department.

The silver streamliner carries exhibits of more than 2,000 electric products, systems and techniques for industry. During each of its stops in the West, the train will be open from 9 a.m. to 5:30 p.m. for inspection by invited representatives of industry, government, the armed forces and civic groups. Tentative itinerary is:

March 1, Tucson, Ariz.; March 2, Phoenix, Ariz.; March 5, San Diego, Calif.; March 6, Santa Ana, Calif.; March 7, Riverside, Calif.; March 8-9, 12-15, Los Angeles; March 16, Bakersfield, Calif.; March 19, Fresno, Calif.; March 20, Stockton, Calif.; March 21, San Jose, Calif.; March 22, 26-28, San Francisco; March 29-30, April 2, Oakland, Calif.; April 3, Sacramento, Calif.; April 4, Reno, Nev.; April 5, Chico, Calif.

● **Richard S. Haltzman** has been appointed zone manager for Hotpoint Inc., in the Los Angeles area, it was announced recently in Chicago by John F. McDaniel, sales manager. Holtzman's zone will cover Los Angeles, San Francisco, El Paso and Phoenix. Howard J. Scaife, with offices in San Francisco, is district manager for the area. Holtzman went to Hotpoint's advertising department in 1947 and was named advertising manager in 1949. He has a wide background in advertising, selling, and merchandising in the electric appliance industry.

● **James C. Taugher** has been appointed meter and instrument specialist for the Pacific Northwest district, General Electric Co., according to an announcement by J. R. Murphy, district manager for the company's apparatus department. Taugher, whose headquarters will be in Seattle, was formerly with G-E's Central district in Chicago as application and commercial engineer. An electrical engineering graduate of Ohio State University, he has been with the meter and instrument divisions since completion of the company's student engineering course.

Industrial Monkey (the machine—not the man on the platform) being demonstrated to a group of utility men in San Francisco. The machine has a hydraulically operated boom that extends 34 ft. and revolves through 270°. It is used by utilities for tree trimming, street light maintenance, mid-span work, transferring hot lines from the 24,000-volt insulated platform, and for many other purposes. The Industrial Monkey, made by Capital Industries Inc., of Portland, Ore., is on a coastwise and national demonstration tour being conducted by R. E. McCoughern.

● **Lear Inc.** will move its entire aircraft radio manufacturing division to the West Coast as soon as plant facilities are acquired, probably in west Los Angeles. Lear's Grand Rapids, Mich., plant, currently working on a $27,500,000 government order backlog, will specialize in government radio and electronic manufacture. The company's Elyria, Ohio, plant will continue manufacturing aircraft pumps.

● **Union Industrial** Corp., Carlsbad, N. M., has been named a dealer for Allis-Chalmers motors, controls, pumps and Texrope equipment in Eddy, Lea and Chaves counties in New Mexico. **J. C. O'Kelley** is president of the firm, which was established in May 1950.

● **Kelogan Radio & Electric** Ltd., 1632 Pendozi St., Kelowna, B. C., announce that they are disposing of their entire electrical appliances stock.

● **National Engineering** & Mfg. Co., Kansas City, Mo., manufacturers of Air-Flo portable all-purpose dryers, have appointed **Marshall & Peron Co.**, 1813 S. Figueroa St., Los Angeles, as distributors for southern California.

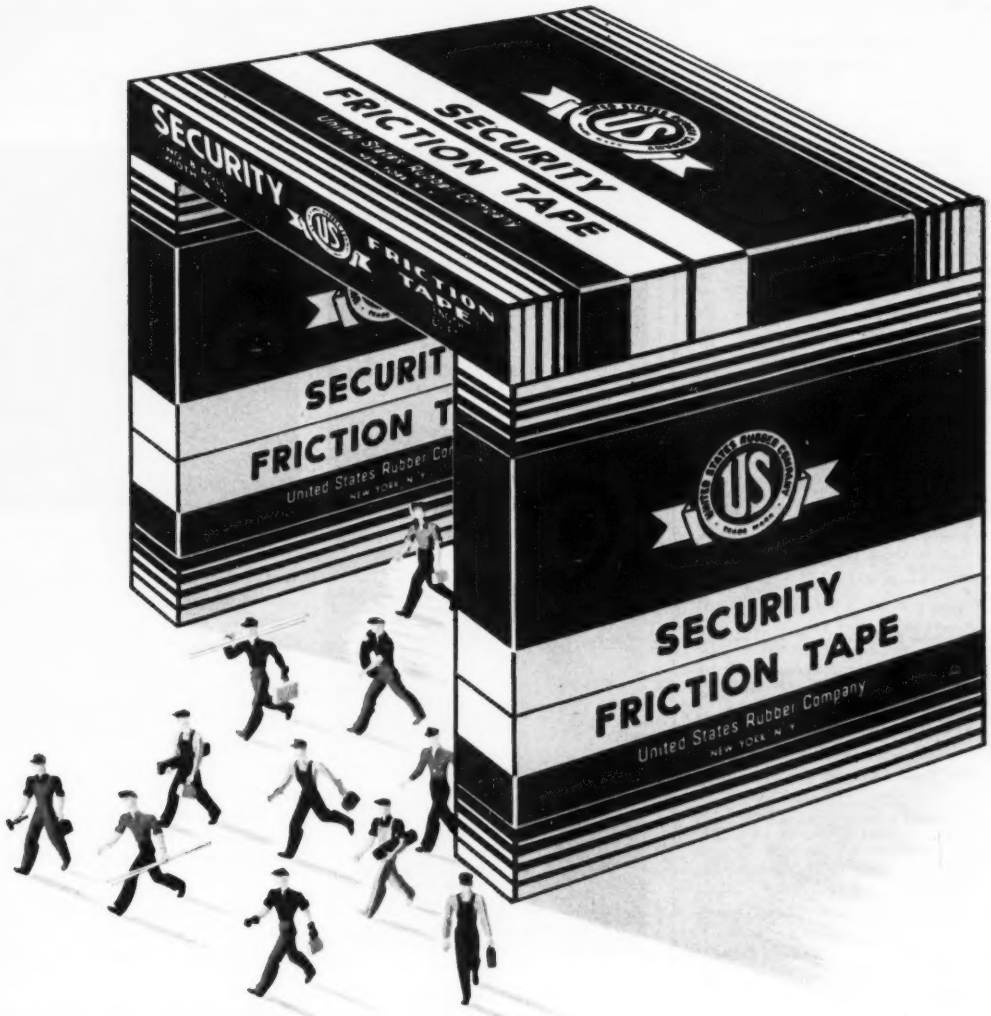
● **Kinney Bros.**, Los Angeles, West Coast wholesale distributors, announces that it has moved its headquarters to Fresno, Calif., which has long been one of the major branches of the company. **E. Edward Faust,** manager of the Fresno branch, has been named a general partner and the name of the company changed to **Kinney & Faust.** The firm will continue to distribute the lines formerly distributed by Kinney Bros., including Hoffman radio and television, Reo lawn mowers, Amana home freezers, General Mills and Manning Bowman appliances, General Electric tubes. The Fresno headquarters have just moved into a new building with showroom, offices and large warehouse at 1740 Van Ness Ave.

● **J. Dolph,** president and W. Coogan, executive vice-president of Dolph Co., makers of insulating compounds and varnishes, while on a visit to the West Coast in December, announced that as of Feb. 1, Tri-State Supply Corp. of Los Angeles and San Francisco is appointed distributors for the Dolph products, marketed under the trade names, Chinalak and Synthite. The company also has developed compounds for protection of electrical devices against fungus, such as found in tropic South Pacific regions.

● **Thomas A. Reese** of the General Electric Co. has been appointed district representative of the company's replacement tube sales organization for the Electronics department, according to William C. Walsh, Western regional sales manager of the division. Reese, who will make his headquarters at 710 2nd Ave. in Seattle, will be responsible for the states of Washington, Oregon, Idaho, Montana and Utah.

● **Matt Cabot,** former Day-Brite Lighting Inc. representative in Los Angeles, has gone into partnership with Sam Russell in the H. B. Squires Co., San Francisco manufacturers agents. Mirko J. Rudman has become the Day-Brite representative in Los Angeles.

● **California Electrical Service Stations** in Los Angeles and San Francisco have taken over the complete stock of parts, tools and equipment of the service stations for Eureka Vacuum Cleaners and will henceforth be factory service stations for this line.



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PROFILES

Davenport

Chadwick

W. L. Chadwick and J. F. Davenport have been elected vice-presidents of Southern California Edison Co. Chadwick is in charge of engineering and construction

Rost

C. A. Rost was appointed manager of the G-E Lamp department's North Pacific sales district to succeed the late W. J. Pitblado

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Frank E. Bodine has been made Central Station division manager for the Pacific Coast district of Westinghouse Electric Corp., succeeding W. P. L'Hommedieu

L'Hommedieu

Bodine

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Quick picture of power growth—history's greatest

4,000,000 horsepower—double the prewar amount—will be the new power capacity of P. G. and E. by summer. Story behind power growth is this . . .

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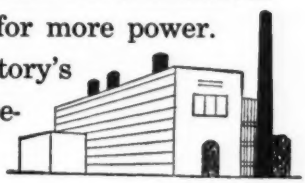
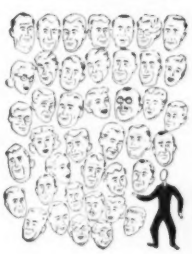


Everyone profits from this expansion—women who do housework electrically for a few pennies a day . . . industries which are supplied with all the power they need at rates among the nation's lowest . . . city and county governments which benefit from the taxes paid by P. G. and E.—the largest property taxpayer in California.



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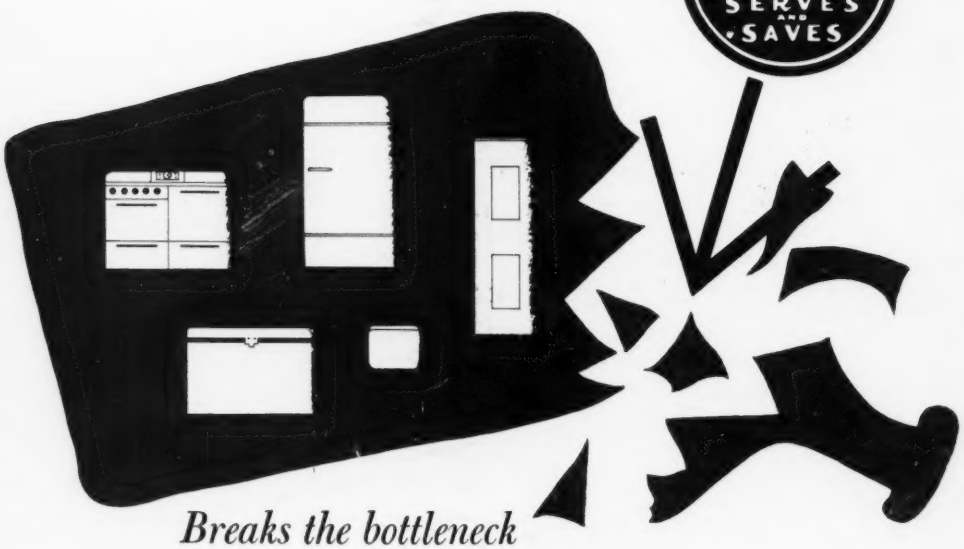
ADEQUATE WIRING SERVES AND SAVES



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and helps all sales!

America's homes are constantly building up their electric load by adding television sets, ranges, water heaters, driers, ironers and other aids to better living. And the wiring has to keep up if that trend is to continue.

A wiring bottleneck in customers' homes can cause a *sales* bottleneck, which is one good reason for making Certified Adequate Wiring a part of every sale or job.

Every electric appliance helps sell another, and as long as it gives satisfaction it is working to everyone's advantage. You're *assuring* that satisfaction when you sell Certified Adequate Wiring. Don't overlook it.

PACIFIC COAST ELECTRICAL ASSOCIATION

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